

**COOP'S
SATELLITE
DIGEST**



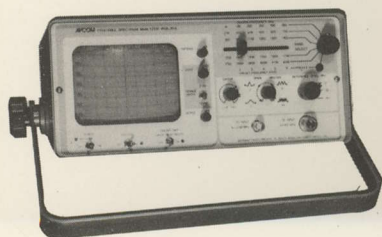
NOVEMBER 15, 1986

INTERNATIONAL EDITION



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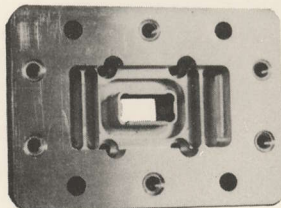
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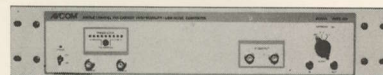


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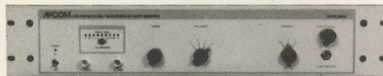
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TOP OF THE MONTH

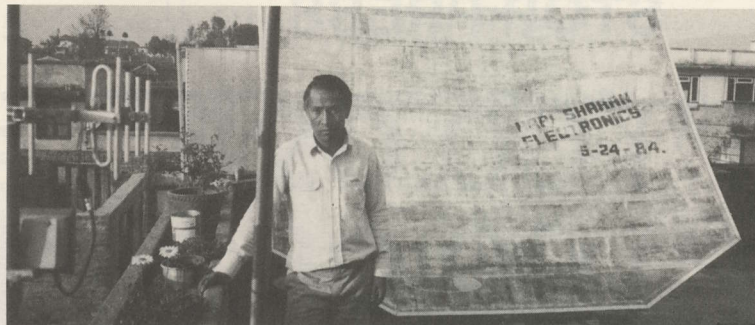
ANTENNAS and the parts that attach thereto occupy a significant part of this month's issue of CSD. **Bob Crean** shows us an innovative full tracking (any position, any orbit) mount system he designed for the University of Virginia Russian TV watching program; Molniya plus Ghorizont in one dish and mount. **Peter Sutro** displays the various feed options available to the installer for 12 GHz systems and comes to some preliminary conclusions about the best way to go.

IN OUR continuing series dealing with the South Pacific TVRO market, we wrap up on Australia with the conclusion that it probably has worse problems than the North American market; at least until the B-MAC encryption system is 'busted'. AND, in our series designed to put you in the cable business, we look at the economics of program tiering.

COOP explains how some of the would-be sellers of Videocipher-busting-circuits are agonizing about the 'proper way' to distribute their products or technology, in his Comments section. And our center **Green Sheets** section reveals the latest listing of TVRO equipment and services for sale.

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OUR COVER/ 9.1 meter Continental dish installed for Yang di Pertuan Agung, the 'King' of Malaysia by Asia-Pacific Satellite Systems of Hong Kong is 'wireless connected' to palace one kilometer away. See **Correspondence** this issue; photo by **Tim Brewer**.

COOP'S SATELLITE DIGEST

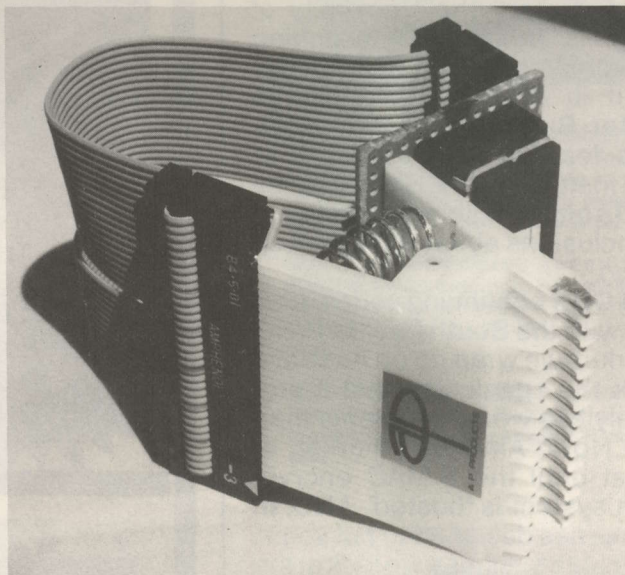


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STOP-PRESS

Late News At Deadline

THIS DEVICE 'busts' Videocipher. Chip-on-a-clip is loaded with 'unit ID number' extracted from authorized and paid-for VC2000, and with the proper technique, the 'master' unit ID is transferred to as many additional units as the 'cloner' wishes. This 'service' or one similar to it is now available in Canada and Caribbean. The November issue of SCRAMBLE-FAX (tm) reports on five separate techniques developed by Videocipher busters to defeat M/A-Com 'security'. To date, none of the known systems are being marketed inside of USA. SCRAMBLE FAX available from 305/771-0505; request NOVEMBER issue.



BBC now testing BBC-1 service on Intelsat Ku service from 27 west; plans to be fully operational to European cable systems in Denmark, Scandinavia, Belgium by December 31st. This is the first BBC television service available via satellite. ITV, new UK 'Super Channel' plans to be active 24 hours per day by January 31st using ECS1 at 13 east.

GI is increasing price for VC2 cable descrambler by \$100 per unit and cable operators are unhappy. No word yet on plans to change pricing on consumer VC2000. Correction: GI has assumed all manufacture and distribution rights to FULL Videocipher line of products, including VC1 (CBS) and VC2 (cable) units. M/A-Com no longer has anything to do with Videocipher, including uplink authorization center in La Jolla, Ca.

SPACE and DBSA have formalized merger; new combined trade association called SATELLITE BROADCASTING & COMMUNICATIONS ASSOCIATION of America. Officers are Taylor Howard (Chairman), Daniel Zinn (Hughes; 1st Vice Chairman), Marty Lafferty (Turner Broadcasting; 2nd VC), John Clark (RCA; Past Chairman). SBCA will hold dinner meeting December 2 at Anaheim (Ca.) cable trade show.

OAK has upgraded and is testing new Orion scrambling system 'level' which chips created by Westar do not decode. Horse racing services (G3, F4) affected; researchers claim new chips will be made available for 'busting' Orion if system is widely adapted.

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COOP'S SATELLITE COMMENT

TRIP/Two PHILOSOPHY Of Selling Busted Scramblers

-Editorial Comment from Bob Cooper-

THE Game Plan

I have been receiving more and more telephones calls of late from people who seem intent upon discovering just what great "master plan" is cooking in my head to try to lead us out of the wilderness of scrambling. In particular, people are interested in **what** we plan to do with the Videocipher decrypting information **when** it finally becomes available. A discussion follows.

Some people believe that the only reason one would study Videocipher is to design some form of substitute box that 'gets around' Videocipher. These people have purely commercial goals in mind; if they happen to break the system, or if they become privy to information that discloses how to break the system, they would immediately begin to distribute either the information or hardware based upon the information. They have commercial gain in mind and some very elaborate schemes involving off-shore publishing and distribution of the information have been concocted. The fact that Patti and I live offshore, have an offshore corporation, and have some knowledge of publishing and printed product distribution suggests to some that this is our master plan. **Sorry, not us.**

There are those who none the less will do this, if they get the opportunity. One cute plan I heard being hatched involves publishing a booklet in the USA and distributing it. The booklet would be complete **less a few key paragraphs** and where schematics or software programs are involved, **less perhaps a handful of key data points**. They would do this from the states without fear of federal agents closing them down because the information would be incomplete and by itself worthless. Then they would place all of the missing data, that is the missing text, the missing segments of schematics and the missing key software routine material onto a single sheet of paper from a non US location, address and ship it. They would do this from a country such as Cayman Islands where it is possible to hide the identity of a business (corporation) owner totally from any authorities. They would ship the 'missing data' in a plain envelope, postmarked from various locations such as Mexico, the Bahamas and so on.

This seems like a lot of work to me. It also seems counter productive since like the Westar chip for Oak (see feature report September) once the **first** data sheet got into the hands of **one person**, copies would be made in large quantities and people who are more careless

would re-distribute it from US addresses. No, that's not a good plan. But it is a serious plan none the less.

Videocipher presents itself as a challenge to at least two separate types of expertise. There is the hardware challenge, exemplified by the people who are trying to bore or burn or scrape their way into U7, the micro-processor chip. These people understand hardware (we hope, since the chips are expensive and hard to come by) and some of these people have rudimentary understanding of the software routines they expect to find locked up in U7. Then there is the software challenge, which to the software scientist is a totally different world from those guys hacking away at U7. Desug, the studious group working on the overall project, has people from both persuasions on board.

The software purist is suspicious of the guys who are trying to break into U7. "The only valid reason I can see to break into U7 is to build a knowledge base to allow them to build Videocipher **clone boxes**. Is that what they are REALLY up to?" ponders a software specialist I talk with quite often. "I have a good business, I have certain assets I have worked very hard to accumulate. I have a family. I will not be a party to anything that will ultimately result in the knowledge to bust Videocipher going public!" exclaims the software scientist.

That statement may unsettle some people. If you are working to bust Videocipher, but you have absolutely no interest in commercial gain should you bust Videocipher, why in the world are you doing it? As our story on Desug in the October issue reports, "because it is a challenge and because it is there". In other words, there are **some people** who are tackling Videocipher purely because it is a challenge. Not only do they **not have** any desire or intention of their own commercial gain from breaking Videocipher, but they are very reluctant to 'share information' with others who might have that objective in mind.

"I will not; repeat, will not under any circumstances share what I have learned with anyone who intends to go public in any form with the breaking of Videocipher once it is broken" recites one talented software person. Sharing of information has become very critical as progress on Videocipher matures. One example.

A software type, totally disinterested in busting into U7 with an electron microscope, started off with a pair of VC2000 units. One he ran through the channels and had authorized. **The second unit he authorized himself.** It worked and he did it all without picking up a

soldering iron or cutting a trace on the circuit board. He needed to know something from the hardware people concerning his approach but was very reluctant to speak directly with them until he was certain the hardware types would not take what he had discovered and turn it into a public disclosure and product on the market. How would he protect himself and his knowledge? A tough question.

Ok, so there are some people out there who are into Videocipher for reasons other than turning a success into personal commercial benefit. Are there other motives?

I think it may be time to share with you my own game plan for all of this information that is starting to pile up. You, as a TVRO distributor or dealer, should understand exactly what I intend to do with the final version of all of this data; that's the version which clearly spells out how **you** can, indeed, **bust Videocipher**. Let me note for the record that we don't have this data in hand yet, but there is ample reason to believe it is now coming.

1) **I will not publish it.** Stateside or otherwise. I may present some very specific explanations of how Videocipher works (learning how it totally works will be a side benefit of busting it) but I will not publish enough detailed data to allow someone to simply build a circuit board or write a software program change and rip off HBO et al.

2) **Once I have full proof** that Videocipher can be beaten, **repeatedly**, using different VC2000 units on **all** of the various services encrypted by Videocipher, then I will send an identical letter or telegram to a group of programmers. I will invite them to sit down with me in a quiet, off-the-record location to see and understand that their security **is broken**. I may even invite a couple of top Congressional aides to sit in on this as silent observers.

3) **Then we will begin negotiations;** not at the first meeting but at the next scheduled meeting. The negotiations will be handled by one or more attorneys who have been solicited to represent the **entire** TVRO industry. You will probably not recognize the name(s) of the attorneys; they will not be people prominent in our industry.

4) **At the two sides at the table**, we will have the cable programmers and the TVRO viewers. Our side will be requesting a complete overhaul of the pricing and distribution policies now in effect. We will request (I am purposefully not using the word 'demand' here) that new pricing be adopted, and that the selling of programming software be broadened so that TVRO dealers and distributors have a part in the distribution scheme.

5) **Our 'chips' will be as follows:**

A) As we sit negotiating, we will represent the only known successful Videocipher 'breakers' in existence. At that point in time, we will be in a position to control who gets this sensitive information, how it is used, and when it is used. Unspoken will be the 'threat' that as we sit negotiating, somebody else will pop up with an identical or some other 'working solution'. It will be in the best interests of the programmers to come to terms with the TVRO negotiators **before** this happens.

Why?

Although not formally representing any trade association nor identifiable group, the TVRO negotiators will have (I believe) the silent vote and backing of the vast majority of TVRO retailers and wholesalers in the country. Yes, a few out there will not be satisfied until you can buy '**BlackCiphers**' capable of bootlegging HBO et al for free. But the majority of the industry realizes that we must and should pay something for premium programming. And I believe that they will support a 'negotiated settlement' to the scrambling wars which brings down prices on cable programming and expands the distribution of software to firms in fields other than cable.

The negotiating team I will assemble and lead will be reasonable, capable, levelheaded business people. This will be the first and I suspect last opportunity that cable programmers will have to resolve this issue with rational people. Should the cable folks choose to stonewall us, they will have to face the consequences of dealing with what will ultimately be hundreds of sources for '**BlackCipher**' boxes.

If we can negotiate lower rates and more favorable distribution policies, we will promise our support to police and stamp out '**BlackCipher**' units. In other words, we will agree to help the programmers control the distribution of '**BlackCiphers**'. This is an offer which cable programmers should not dismiss out of hand.

What I have in mind is really the same things we are asking Congress to do **for us**; lower rates, universal access to programming. I have no faith that we will see a Congressional solution to this problem soon enough to rescue the home TVRO industry. I also have no hope that the recently completed FCC Inquiry into our problems will happen soon enough to save us.

I see three primary reasons why so many talented people are working on busting Videocipher so hard:

- 1) To turn a few **bucks** for themselves, or,
- 2) To give some **negotiating power** back to the TVRO industry (we have virtually none at the present time), or,
- 3) To 'kick ass' on the people responsible for the mis-handling of scrambling to this point.

Creating an underground network of '**BlackCipher**' boxes and information will not help this industry recover. It will kill us dead. Yes, a handful of people could get very rich in a short period by selling '**BlackCiphers**'. I hope they have a getaway plan carefully worked out and are prepared to live the rest of their lives running.

However, the information that would make a few selfish people rich, should they choose to crank out '**BlackCiphers**', could be used in a much saner manner to make an entire industry rich again. **I vote for that approach.**

As for the 'ass kicking', just leave that to the negotiation team.

SO Where Are We?

Many people reading reports here in **CSD**, reading our **SCRAMBLE-FAX** newsletter, or listening to our **SCRAMBLE-FAX** Hotline are under-educated to appreciate much of the data distributed. That's not an

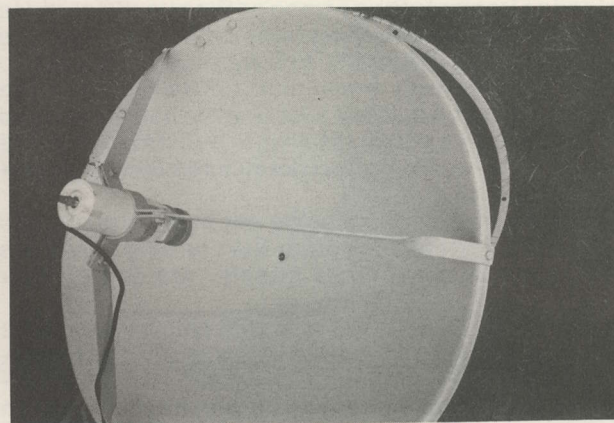
12 GHz FEEDS - WHO MAKES THEM?

By Peter C. Sutro
Associate Editor/CSD

As the day rapidly approaches when Ku-band delivery of satellite cable (entertainment) programming becomes a viable reality, it is important for home satellite dealers and installers to understand the options available to them both for retrofits and for new installations. We have tried to compile as complete a list as possible of the various products and configurations available on the market today. We apologize for any omissions since new entries seem to be appearing daily. If you will send us information on such products we will include them in subsequent issues.

The photographs which accompany this article were taken on a Laux 6½' antenna which is one of the most accurate dishes we have found for Ku-Band reception. Its 8 steel galvanized panels give it extreme accuracy and rigidity and its buttonhook feed support is rugged. While we always recommend guy-wiring the feed because of the necessity of very accurate centering at Ku-band, the short focal length of the Beta minimizes this problem. Other dishes which we have found to work well at Ku-band are the Stolle 6' aluminum (expandable to 8'), the DH Antenna spun aluminum dishes in various sizes and the Northsat and DX offset feed dishes, although these require a different feed-horn treatment than described in this article.

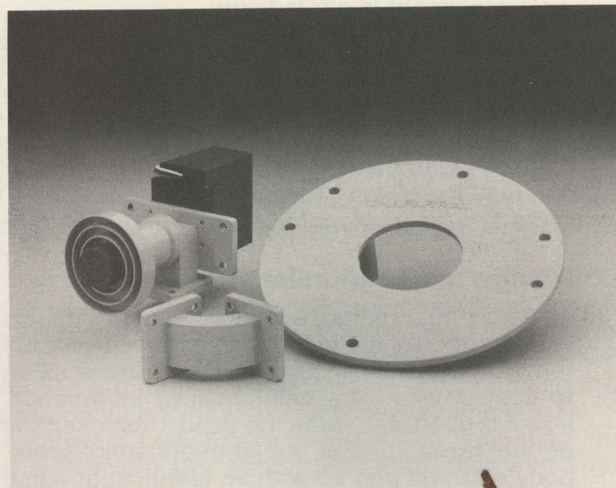
The Ku-band LNB's used for the tests are from Echostar, DX and STS and all gave extremely good results. There are many other excellent Ku-band LNB's on the market from MSE, CalAmp, Sony, and Panasonic. Their prices are declining rapidly and their quality is improving. You should look for LNB's in the 2.0 dB range as this noise temperature (as opposed to 2.5 dB) will enable you to minimize the size of your antenna. We feel that LNB's in the 1.5 to 1.8 dB range will be a reality in the near future at dealer prices around \$200. The receivers used for the tests were the Echostar 1000 and the DX-500. While both of these receivers



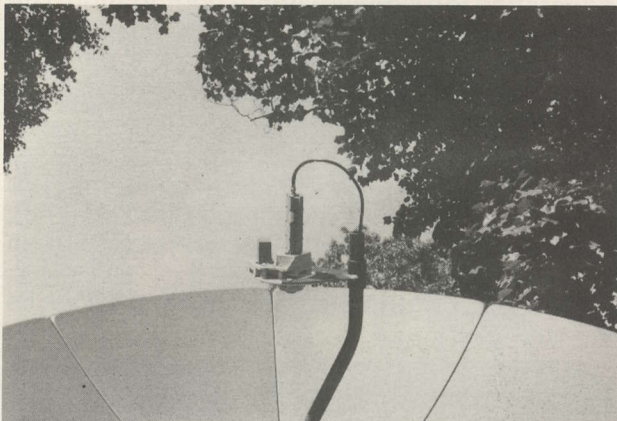
SINGLE POLARIZATION scalar feed with STS LNB mounted on DH 32" spun dish. Feed is rotated manually for second polarization.



MAXIROTOR installed on DH 32" antenna, Echostar LNB and Echostar 1000 receiver. Reception on monitor is NBC feed on K2 bird.



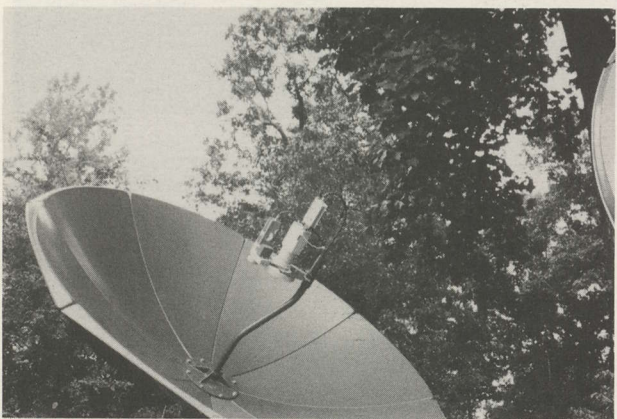
CHAPARRAL POLAROTOR I-Ku with prime mounting plate and elbow assembly.



CHAPARRAL Pioneer Ku-band prime focus feed installed.



SEAVEY 12 GHz feed with DX LNB.

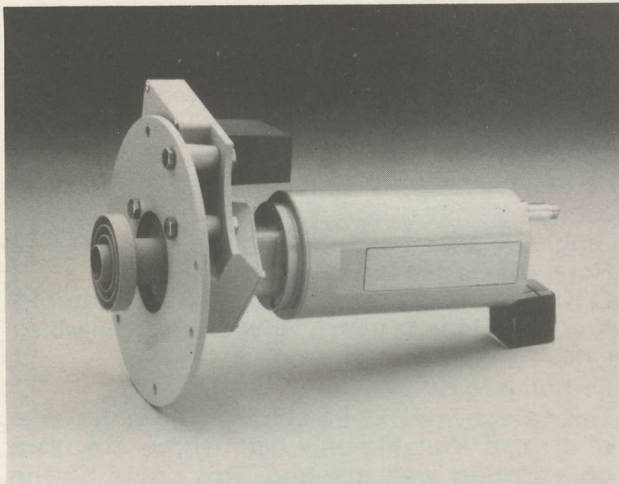


CHAPARRAL PIONEER kit attached to Chaparral Polar Amp with DX BDC. Ku-band feed is offset to left of C band prime focus feed.

ers are in the lower price category, they gave excellent results. One must keep in mind that some receivers (notably DX) operate in the 900-1400 MHz frequency range while most use 950-1450 MHz and be careful to match the LNB's accordingly.

The main categories of feeds used for Ku-band reception are the following:

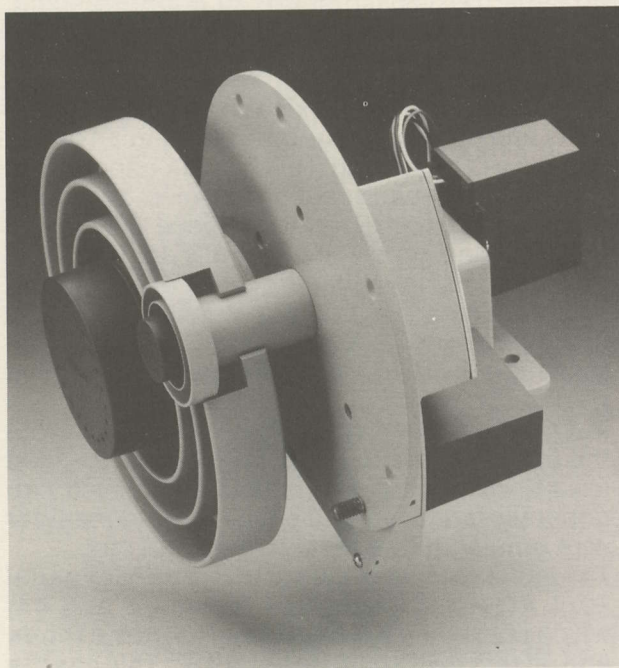
- 1) Single polarization prime focus.
 - 2) Rotatable prime focus.
 - 3) C/Ku-band feeds with Ku offset, both rotatable.
 - 4) Ku/C-band feeds with C offset, both rotatable.
 - 5) C/Ku-band Prime/Prime feeds.
 - 6) Orthomode Ku-band feed.
- 1) This category would be utilized only in the case of a **fixed** Ku-band-only dish where only **one polarization** was required. This could be the case in a commercial installation or in the case of a very inexpensive home patio-mount dish of 32" to 48" where the rotation of the feed could be accomplished manually (**figure 1**). These feed horns are available in a variety of configurations from conventional scalar (Chaparral), conical horn (DX), cylindrical (Stolle) and off-set (Northsat).
 - 2) This category would be used on a **Ku-band-only** antenna which would normally be motorized for access to the entire Ku-band arc. It provides **polarity reversal** and skew control (**figures 2, 2A, 2B and 2C**). When used with very small dishes a 90° elbow (not shown) should be used to minimize aperture blockage by the LNB. Manufacturers are Chaparral, MaxiRotor, Seavey, Delta Technologies, and Northsat for offset dishes.
 - 3) The Chaparral Pioneer kit is used mainly for retrofits and places the **Ku-band feed** at an **offset from** the C-band feed. This has the effect of not altering the C-band reception while degrading the Ku-band signal (**figure 3**). Since retrofits are usually done on dishes in the 8' to 12' range there is possible Ku-band 'overkill' (assuming an accurate dish) so the degradation in theory could be unnoticeable. A variation of this configuration by Chaparral, Seavey and others places the Ku-band horn somewhat or totally **inside** the C-band scalar rings thus minimizing the off-set of the Ku-band. Both C and Ku-band feed(s) have their own polarization which can generally be driven by a single three-conductor wire running to the receiver terminal strip.
 - 4) The latest version of category 3 is the Chaparral 12/4 Polarotor Dual Feed (**figures 4 and 4A**) which places the **Ku-band feed at prime focus** and offsets the C-band feed by $2\frac{3}{4}$ ". This has the effect of maximizing the Ku-band signal while degrading those of the C-band. A world of caution here - while the degradation of the C-band might be within acceptable limits, unwanted



CHAPARRAL PIONEER kit for Ku-band only service.

side effects might be the worsening of side-lobe performance and/or the increased effect of terrestrial interference if present.

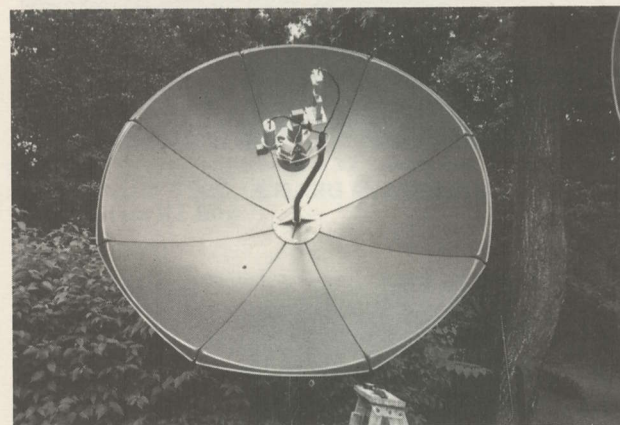
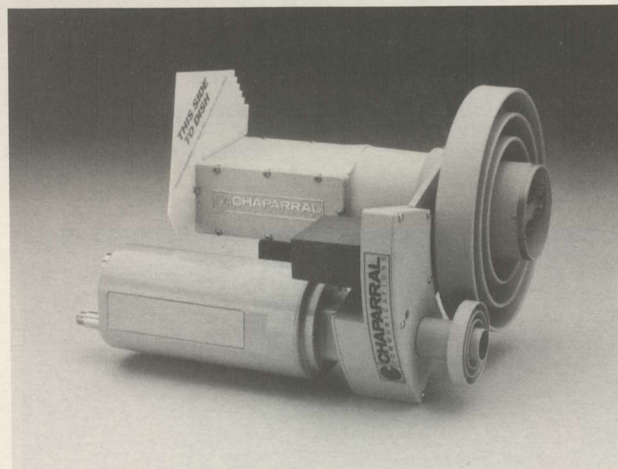
- 5) The most interesting, complicated and controversial feeds are those which place **both** the C and Ku-bands feed concentrically **at the prime focal point** of the dish. The C and Ku-band signals are then separated and guided to their respective Ku-band LNB or C-band LNB or LNA. Three main configurations have been studied from Chaparral, STS and Seavey. The difficulty in designing such feeds lies in cleanly



CHAPARRAL 12/4 Polarotor dual band feed produces 2 $\frac{3}{4}$ offset for C band feed which could enhance terrestrial interference or degrade side lobe effects from closely spaced C band birds under adverse conditions.

separating the signals without degradation. The approaches of the three companies are quite different:

- a) STS (figures 5 and 5A) has opted to 'divert' the C-band signal around a conical-shaped piece of dielectric material and to deliver it to the LNB through 4 symmetrical guides. The Ku-band signal is fed directly into its LNB. Both ports have their own polarotation capability.
- b) Chaparral (figure 5B) has chosen to design its



HEAVY STUFF/ The STS dual-band prime focus feed with DX LNBs make for a relatively heavy front of dish package and may create unwanted blockage effects.

"Bullseye"™ using an orthomode coupler for the C-band signals and a Polarotor™ approach to the Ku-band. This has the disadvantage of requiring two C-band LNB's (at today prices, that's not too bad) while it has the advantage of using only one rotor motor (less chance for failure). Boman has also announced a similar approach but, to date, we have not been able to secure one for evaluation.

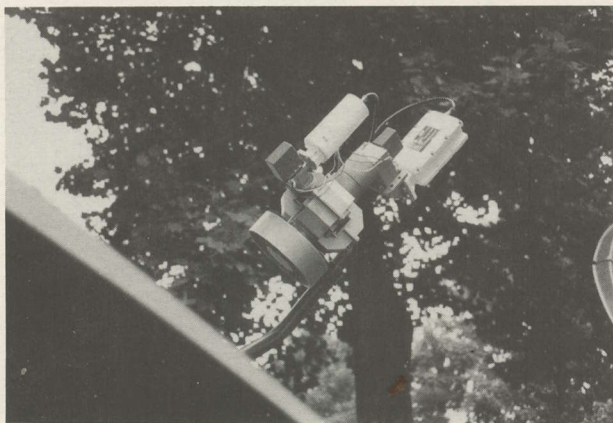


AUTHOR adjusts CalAmp's Masterfeed Dual LNB. In the background, a perforated Laux 9 foot Beta with Seavey C-band feed, MSE LNA and DX block downconverter.

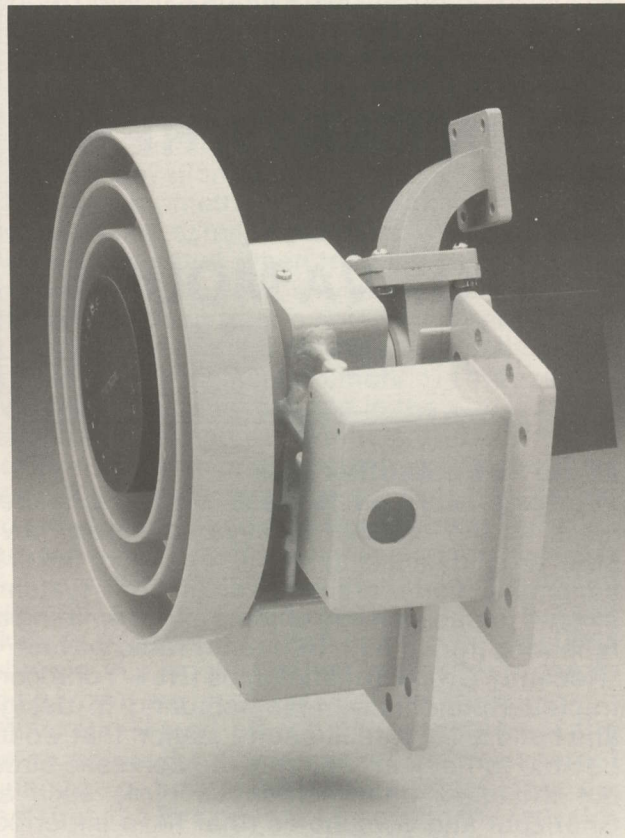
- c) Seavey's approach is different to the extent that it uses one C-band LNB, one Ku-band LNB and only one rotor motor which changes both band's polarization. You will probably experience some difficulty in mounting this feed as the bosses on the back of the scalar plate protrude and make it difficult to adapt to a normal buttonhook. However, with some ingenuity and extra parts, you should succeed.

We have **not made** a scientific evaluation of these three feeds and this is not a product technical review. However, all seem to work and all have their own advantages and disadvantages. It should be noted that the extreme weight of all of them (upwards of 11 pounds with LNB's attached) makes it imperative to securely and accurately guy-wire them. There are some apparent performance problems to sort out and all 3 will undoubtedly improve with time.

- 6) Finally there is the Ku-band orthomode configuration from Seavey and Northsat. The



STS Dual-band feed with STS LNBs.



CHAPARRAL Bullseye™ package for prime focus feeding on both C and Ku bands.

applications for this feed are rare at this time as it would be used only in commercial SMATV applications (**but** no Ku-band programming is licensable by SMATV) or in the rare case that a Ku-band-only dish were to be used in a private home, multiple receiver installation.

We wish to stress that the testing of the feeds mentioned above was done in a "back-yard environment" and **not** under scientific conditions on a test range. The article is intended only to illustrate what is available on the market today in the Ku-band field. Suffice to say that all the products worked! In the C-band feed field there is one new product worth mentioning. It comes from California Amplifier which has sprung back from the ashes of **near-bankruptcy**, and is sold by them and also manufactured on an OEM basis for Houston Tracker. It is called a Masterfeed-Dual™ LNB (**figure 6**) and simply consists of two 950-1450 MHz LNB's contained in a single housing. It has no moving parts and its 30° polarity window removes the necessity for skewing. It is especially suited for those mini-SMATV systems where the dish is fixed on one satellite and several neighbors in garden apartment complexes or trailer parks wish to share the same dish.

POINT ANYWHERE U OF VA MOUNT

XY vs. Az-El: Another look

Systems designed to track moving satellites (such as the Russian Molniya satellites), have been around for a long time. Even before the first communication satellites were in orbit, systems existed to track moving objects either emitting or reflecting (radar) high frequency radio waves.

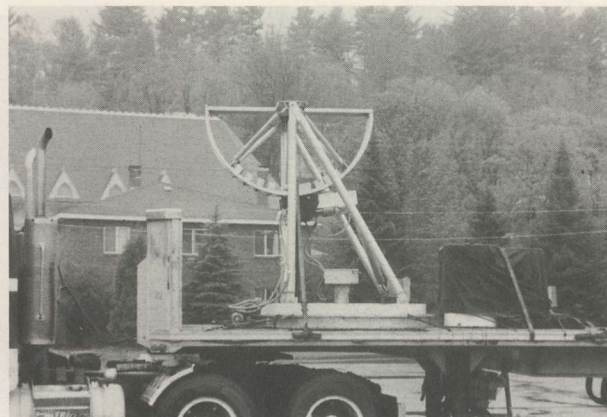
Recently Orbita Technologies (New York) contracted Roundhouse Manufacturing to design and build a 16' satellite earth station that would be able to "look at" not only the domestic birds, but the quasi-geosynchronous birds such as Ghorizont and Symphonie (that have imperfect geosynchronous orbits) and the Molniya satellites, which move quite fast. As the system was going to be used by university personnel, it would have to be fairly inexpensive and easy to operate.

The System

The system design started with an ECI (Engineered Communications Inc) 16 foot reflector. It was mounted on a two axis elevation over azimuth mount. In the past we have built so called **X-Y** mounts, primarily for Molniya only service, because that geometry lends itself to easy tracking of birds that pass very close to overhead. We will revisit the problems involved with choosing mount geometry in a bit.

Driving each axis are severe-duty, totally enclosed Eurodrive brake gearmotors linked to the moveable parts of the mount via number 50 chain. A completely redundant drive system is used in elevation to eliminate any danger in the unlikely event of chain failure.

The brake gearmotors are powered by a computer controlled three phase power supply which can select which axis to move, choose a direction and speed, energize the appropriate motors and shut them down again at the precise moment. Software for this system was written by Star Tech-

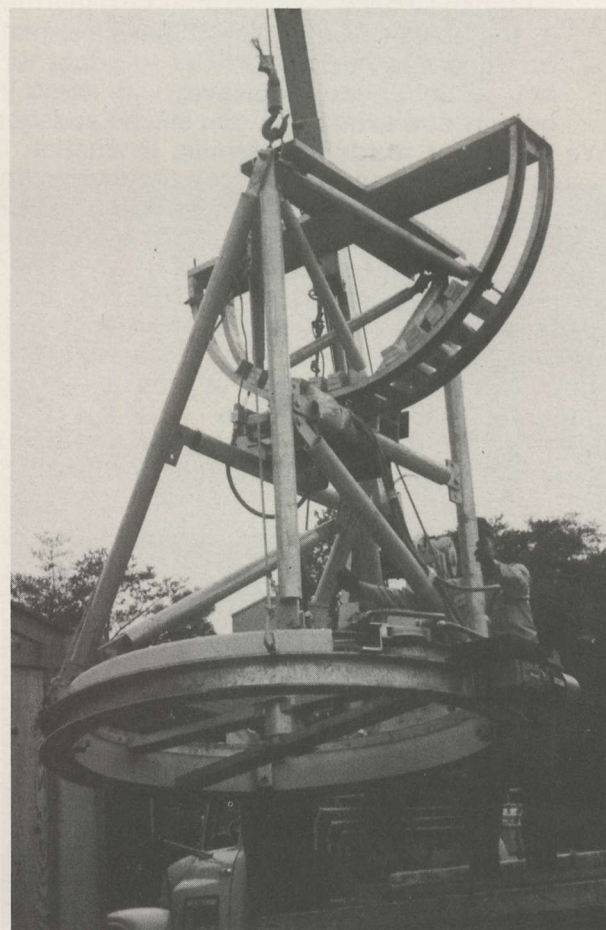


FULL TRACK/ Any track mount, FOB White River Junction, Vermont

nologies of Boulder, CO.

The Mount/Az-El or X-Y?

In past articles, we have talked about the difference between an **X-Y** mount and an Az-El mount. We quickly refresh everyone's memory:

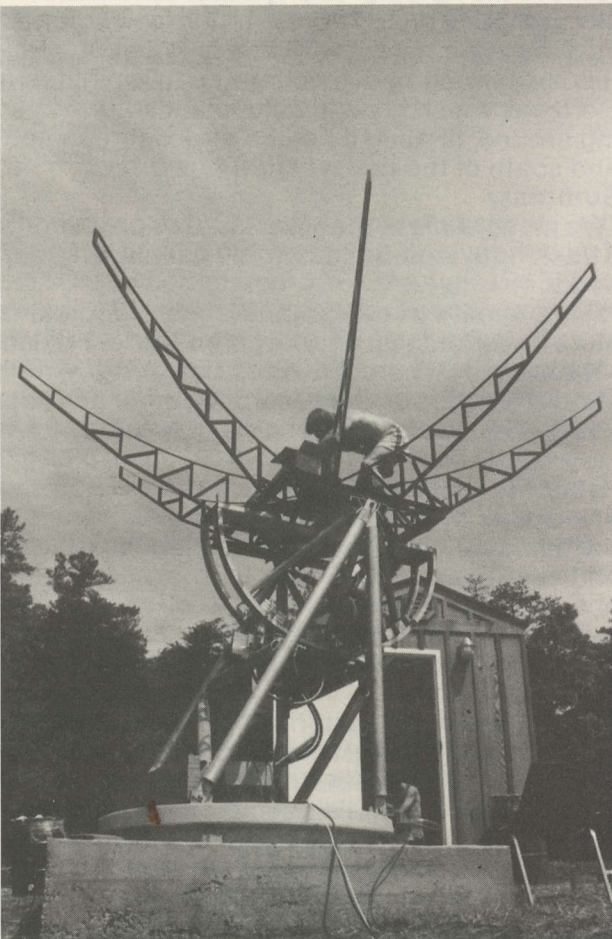


NOT EXACTLY your typical backyard dish mount (1,680 pounds without antenna!)



UNIVERSITY OF VIRGINIA system designer Kenny Schafer (center) providing additional azimuth counter weight (about 150 pounds).

An Az-El mount, or Elevation over Azimuth, as it is sometimes called, is the most widely known and used commercial mount geometry. Whether motorized or fixed, it consists of an elevation axis



16' ECI DISH looks much smaller on 'monster mount'

(a horizontal axis about which the reflector moves vertically), which is mounted on top of an Azimuth axis (a vertical axis about which the reflector moves left and right). An X-Y mount, sometimes confusingly called an Azimuth or Elevation mount, consists of an azimuth axis mounted on top of an elevation axis.

Why two geometries? Steve Birkill, one of the earliest home satellite pioneers, wrote in **CSD** a long time ago that, when tracking satellites that pass close to overhead, a system can experience difficulty tracking due to something called "Singularity at Zenith". If a satellite is directly over a ground observer's location, motion in the azimuth axis will produce no change in the direction the reflector is pointed. An example of this birdbath position is shown in an accompanying photo.

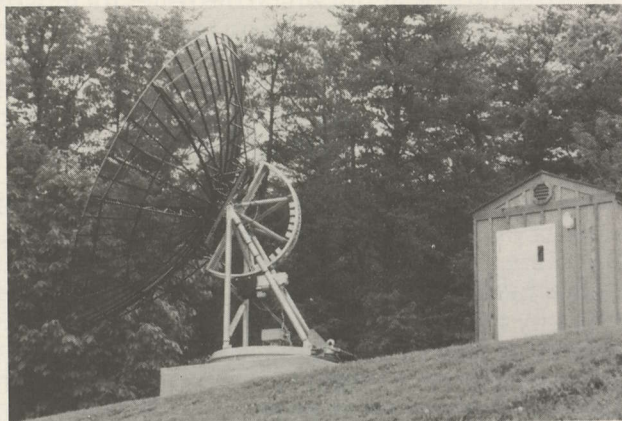
An X-Y geometry solves this problem by having **no axis perpendicular to the ground**. The problem can exhibit itself when the satellite desired is in line with any axis of the mount. An X-Y mount has both axes parallel to the ground, so it is unlikely to encounter a large number of situations wherein this would happen (satellites close to the horizon are an example of this situation).

What Birkill (and others) did not realize at the time was that the problem only became apparent when one or more of the following situations existed: **first**, the bird needs to be within the reflector beamwidth distance from true overhead. **Secondly**, sloppy hardware "adds" to the reflector's true beamwidth, so the result can be a very large "hole" in the sky that the system will have a difficult time tracking through.

High cost, high precision radar tracking systems, with sophisticated computers running them do not have this problem. We believe the problem is one of **our own** (the satellite industries' own) making, in that low cost equipment not originally designed to track moving satellites has been used to do the job.

We could not use X-Y geometry here, because the system had to be able to point at **any other bird** in the sky. So we started with a good quality high precision 16 foot reflector with a very tight beamwidth and built a heavy duty Az-El mount under it. Many Molniya systems incorporate nothing more than a standard polar mount with an additional actuator on the "elevation axis", thereby making it an X-Y mount. We believe that the wide availability of polar mounts contributed to the avoidance of the singularity problem — but at the same time, also let systems designers get away with more slop in their mounts.

And, it's hard to be critical, for two years ago there was very little satellite mount hardware for sale better than the run of the mill junk (which was fine for Galaxy 1) and the S-A, or Anixter type stuff that might set you back \$30,000 — just for the dish



JOB completed in Virginia

and mount — never mind motorized axes, or computer systems etc. By the time you're done, you can shoot through the \$100,000 mark without much difficulty.

We set out to design good solid hardware, manu-



SINGULARITY of zenith/ the much dreaded 'dead overhead' look angle

factured of simple components. The mount shown in the photos is very much overbuilt for a 16 foot reflector (we have put a 24' reflector on the same unit), but the stiffness created by sizing the structural members affords a great deal of precision when tracking a satellite.

To give you a frame of reference, the brake gear-motors are designed to bring the reflector to a full stop within .0240 degrees of arc. Systems we are now building can stop the reflector within .0100 degrees of arc from full tracking speed. This is well within the beamwidth of the reflector (by one order of magnitude) and minimizes the problem of singularity at zenith significantly. It should be pointed out that even if the problem is encountered, there are software solutions that can be applied in addition to designing and building stiff hardware and using an accurate reflector. A satellite such as Molniya is overhead only for a few minutes each pass (four birds per day), so the computer control system can determine when it is about to happen and take appropriate action.

The added benefits of using standard commercial geometry in this situation include being able to move the reflector **to any other satellite** in the sky and peek on it. There are no tracking errors, such as are inherent with any polar mount. Plus, this system can accomodate such satellites as Gorizont, which have the sloppiest station keeping around, floating as much as 4 degrees north and south of the geosynchronous orbit.

Summary

We recap some of the essential design elements a tracking system builder would be wise to keep in mind.

First, quality of design and construction is far more important than mount geometry for tracking Molniya only. The decision to use X-Y geometry should be made on the basis of whether any other use is required of the terminal (i.e. geosynchronous birds).

Second, tracking speed is extremely important. The slower the tracking speed, the easier it is for the computer to do the job of moving the reflector and still keep up with all of the computation chores as well. A transit speed of 10 times the tracking speed makes it convenient to move from one satellite to the next, but also complicates the control system.

Finally, quality of design and smart use of a sufficient amount of steel is essential. One technique is to do all the homework on the design of the mount assuming a dish some 15 to 25 percent larger than what will really go on it. A fixed or home polar mount simply does not provide the precision that a commercial duty tracking mount does. The laws of Entropy dictate that there is no such thing as a free lunch and there is no area where it is more true than that of mounts.

TVRO IN PACIFIC/ AUSTRALIA

AUSTRALIA/continued. In the October 15th issue of CSD we established that TVRO began in Australia when Fraser Hickox, an Australian, and US industry pioneer H. Taylor Howard established a firm to sell 16 to 20 foot 'Oliver Swan Spherical' dishes, an ICM receiver and other bits and pieces to 'outback' residents. However, they were battling the Australian Telecom authority every step of the way since Australia had a 12 GHz (Aussat) plan and the premature introduction of home dishes, at 4 GHz, was not favored by government policy. One of the tactics adopted by the government to throttle back the expansion of premature (4 GHz) TVROs was to place high import duties on the LNAs, receivers and other electronic parts. The government assigned 'engineers' to follow Howard and Hickox around Australia, hopeful that these personnel could persuade potential buyers of 4 GHz terminals to 'hold off' until the official, 'real-thing' arrived (1986) at 12 GHz. We rejoin that report at this point.

The government people were reasonably successful in putting out the 'brush fires' started by H and H; for a period from 1981 through 1983, Australian TVRO sales languished as people were told **"TV is coming, satellite TV is coming. But do NOT purchase those interim 4 GHz systems because they will be useless when the real thing shows up!"** Hickox would leave Australia in this time frame to set up shop in Hong Kong where today he operates a very successful TVRO sales and installation business throughout the Pacific primarily dealing with hotels, resorts and other 'monied clients' who can afford complex systems with 'standards conversion' and everything else one needs to function in that part of the world.

One of the bush fires started by the continent wide publicity fueled by the H and H traveling out-back road shows did not go out. That was in **Papua New Guinea** where several entrepreneurs involved in government operated telephone communications caught the satellite TV bug. Papua New Guinea (or **PNG** for short) is that country lying just to the north of the northeast coast of Australia. PNG is best known perhaps for its until-very-recently still active 'head hunters'; natives there, at least in the rugged interior, still enjoyed a Saturday evening pig roast around a community fire where

the roastee was not a pig at all. PNG, not too surprisingly, had no television although it had people who wanted television. They wanted it so badly that they were investing tens of thousands of dollars to erect gigantic off-air aerial systems designed to suck in extremely weak signals from the northern Australia coastline, often over terrestrial paths as long as 600 miles. Later, in the early 80s, as VCRs became more reasonably priced and air transportation services improved, these same television pioneers hired daily tape forwarding services from such jumping off points as Cairns and Brisbane in northern Australia. PNG had a very small, but well paid, 'expat community'; people, largely from Australia, doing their 'duty' in PNG on commercial assignment for various mining, forestry, agriculture or government agencies. The PNG assignment was so distasteful to most people that firms fortunate enough to coerce people into contracting to work there for periods of 1 to 3 years were willing to do almost anything to keep their people in PNG. Satellite television systems became both a status symbol and a new 'perk' for those doing their time in PNG.

The PNG TVRO pioneers were amongst the



Ku band dish for Aussat in operational (note high look angle) position at Cairns in northern Queensland.

most fortunate in the world. They had customers so desirous of purchasing systems that price was no object (indeed, 'the company' often paid for it anyhow). They also had a government that was reasonably tolerant of this new fangled electronic gadget because the government knew that if satellite television made life more bearable for expats whom they depended upon to help their country grow into the 21st century it was something to be allowed. The government even encouraged extremely high prices for home dish systems because they were concerned that if the prices dropped too low, natives could afford them as well. Rather than simply outlawing native ownership, they saw to it that prices stayed up there where very few natives could afford such a system. Over the years, Olga Sawtell back in Australia estimates perhaps 700 home dish systems were sold in PNG. The average price, according to Sawtell, was \$30,000 (Australian). Not bad for a 12 foot (Paraclipse) dish, a linear actuator, and a receiver from KLM, Automation Techniques, Drake, Uniden or Intersat.

In defense of the \$30,000 price tag (which possibly has American dealers reading this green with envy), you have to remember that while some of the PNG dish systems were installed relatively close to 'town', many went into rural areas where the only access to the site was via a tortuous 20 hour four wheel drive trip through rain forests and swamps only recently abandoned by 'head hunters'.

Much of this came to a screeching halt when in February of this year Australian feed(s) on Intelsat were shut off and moved to the 12 GHz Aussat service. Outback receiving systems in Australia, as well as those in PNG, New Zealand and scattered across other islands such as The Solomons, Vanuatu and elsewhere were immediately impacted.

The launch of Aussat was viewed with both skepticism and concern. In PNG, one of the most desirable services was gone from 4 GHz feeds. They were more fortunate than some, however, because the Indonesian **Palapa** satellite places a 30-32 dBw footprint over PNG and on Palapa there are still additional programming sources, including some English language programming. In Australia, New Zealand and through the bulk of the islands that dot the South Pacific, with the loss of Australia's ABC 4 GHz viewers were down to AFRTS **and only AFRTS.**

Olga Sawtell's ACESAT controls, by her admission, 68% of the Australian and South Pacific market for TVRO systems and hardware. Olga says her firm serves approximately 90 installing dealers spread throughout Australia and beyond which says there may be a total of 120 dealers out there. Sawtell saw the demise of 4 GHz and geared her firm for a jump-start entry into Aussat's 12 GHz world before Aussat was ready to provide pro-



AUSTRALIAN SUGAR CANE produces big \$\$ in rural areas still without TV service.

gramming.

"We had 2,000 Aussat 12 GHz home systems 'sold' before there was any programming OR hardware to deliver" she notes. Some of the business was a retrofit market; Taylor Howard's large and cumbersome 16 to 20 foot spherical dishes littering the Australian outback aside, ACESAT was ready to help dish owners convert to 12 GHz or in locations such as PNG, add 12 GHz to the existing (typically Paraclipse) 12 foot dishes. PNG lies on the fringe of service for the northeast beam of Aussat and readers should keep in mind that while the programming from ABC is all coming from the same place initially, Aussat breaks the country up into geographic regions and provides a bore-sighted beam into each region rather than a nationwide (CONUS-like) beam.

The basic 12 GHz system consists of a receiver from Plessey (a UK firm with a local manufacturing facility in Australia) and an antenna. The Plessey receivers are designed to decode something called 'B-MAC', **a form of encryption** created in the UK originally and then exported first to Canada, then the USA and finally to Australia by Scientific-Atlanta. 'B-MAC' is roughly the equivalent to Videocipher in encryption technology and if you want to see a B-Mac encrypted service, look at the Holiday Inn feeds on G-Star here in North America or the New York Racing Authority 4 GHz feed on transponder 18, on G3. Scientific-Atlanta holds significant marketing rights for B-Mac under license from the UK inventors and one of their first substantial 'sales' was to the Australia government 'Aussat' program.

Plessey holds the **only** Australian license for building B-Mac decoders. Aussat uses B-Mac to encode all video transmissions. Ergo, if you want to receive television transmitted via Aussat you **must purchase** a Plessey receiver (**). And Plessey is of course an Australian based firm. So Plessey has



PLESSEY TVRO receiver is described by Sawtell as a 'fine piece of Australian work'. Unit has infrared remote control, does most everything that high end American receivers do. Dealer price is approximately twice that of comparable US units, however, but B-Mac decoder is built-in.

certain rights and a significant hold on the Australian satellite market. Installers of TVRO, users of TVRO can go no place else for their receivers. Plessey and Aussat have one-upped the old high tariff barrier game; they have built-in legislation that protects Plessey from competition for some period into the future. Most people think that period is at least ten years. Plessey is not saying.

"The initial Plessey receivers were terrible; they were not reliable" reflects Olga Sawtell. She comes from the old 'Charlie Ergen School' of TVRO distribution; **first** you find the best product you can find **and then** you go out into the field and you hold seminars to teach the installers how to install and use the equipment. Sawtell says that many of Plessey's problems with reliability have improved since February but it was a rough start-up period.

"We could have sold another 1,500 home dish systems during that start up period if Plessey had been more attuned to the equipment problems and had helped us promote the equipment and systems". Unfortunately, what did happen is that people who were pioneers did have problems and even in the remote outback the word spread. Others who were candidates for instant systems held back, reluctant to purchase until the bugs were worked out.

"The emotion and desire for a system was high at first; that is when we should have been prepared to push a 'mature product'. As an industry we were not prepared and now those sales that should have happened have been postponed. It will take something significant to start sales rolling again".

The foul-taste of equipment problems persisted through the Australian fall and into the winter months. Sawtell and others took up some slack by servicing the PNG market.

"I believe that perhaps 300 of the PNG system owners have made the conversion or adaptation to 12 GHz". Now, ostensibly, the Aussat satellite was designed, built and paid for to serve Australia. Very few Australians believe PNG is a part of Australia. Are these 12 GHz systems going into PNG being shipped in the dead of night by charter boat captains willing to run the blockade?

"The Aussat authorities control who gets their service. Each receiver has its own address code and in the turn on procedure each is identified with an Australian address. In the files, at least, every Aussat receiver out there is **someplace** in Australia."

"The sales effort has failed in Australia. Plessey is partly to blame, but I believe 65% of the blame rests with the Australians who operate Aussat. They have been less than straight forward in delivering the services they promised, when they promised them. They are so desperate for 'numbers', to be able to show with pride the 'success' of the Aussat system, they have willingly taken those 300 (plus) systems in PNG and pretended they are actually in northern Queensland."

The Australian TV broadcasting industry is in something of a mess. At stake is the future shape of the industry, as a terrestrial service, and the role which satellite delivery will play in the next generation of Australian telecasting. The word 'network' is key here.

Basically, the government operated ABC aside, there are no real 'networks' in Australia. But commercial TV operators would like there to be networks, as we know networks in the USA. They would also like these yet-to-be-born networks to be interconnected using satellites. The government is in a quandary over all of this, basically opposing the concept.

Outside of the major population centers such as Sydney and Melbourne there are government authorized 'territorial stations'; stations established to serve rural regions with an occasional town or two thrown in for good measure. For people living where these stations operate, they have the national 'ABC' service **and** one non-ABC station. **Cable television is illegal** in Australia except under very restrictive circumstances so the technical opportunity to import 'distant terrestrial signals' into rural communities, or big cities, is also outlawed. After more than a decade of watching their big city cousins in cities such as Sydney have access to perhaps 6 channels of television, the rural people are loudly asking for **more television**. The government advanced a pair of plans. In one scenario, the existing commercial station operator would be allowed to put on the air one, two or in some circumstances even three additional channels. One man or company would operate **all** of the commercial outlets in an area. This plan was sup-



RURAL HOMESTEAD adjacent to cross-continent train track would be challenge for US Rural Electrical Cooperatives. Not in Australia where tens of miles of power lines may be run to serve a single homestead.

posed to attract the support of the rural TV station operators since their 'monopoly' would grow **vertically**.

The TV station operators had a better idea and another plan was advanced. They wanted to be able to jump across into the next rural service area, served by another firm just like their own, and put in a new channel. They hoped to be able to 'network' the two (or more) channels together so they would spread '**horizontally**'. The idea was that A would go into B with a new channel, and B would back haul into A with a new channel. Each area would get additional television programming and the cost of operation would be minimized since the actual programming costs would be largely for a single area.

All of this was sketched by a bureaucrat to satisfy the problems he or she saw in expanding television in rural areas. The big city telecasters liked **neither of the above** since these plans would leave them where they presently are; serving places like Sydney and Melbourne with programming which essentially was a captive of the market it was created in because of the fears of actual networking on a full time basis.

Some of the more farsighted rural TV operators, and all of the big city TV station people saw the Aussat satellite system as a tool for greatly expanded national service. The key was being able to use Aussat to transfer programming from Sydney to Cairns, for example, to feed a local affiliate in that area. A limited amount of program exchange is taking place but it is between station owners on a contract rather than a network affiliation basis.

The Australian government promises to have all of this sorted out, and operational, by 1989. They are promising every region of the country will have ABC plus three commercial channels in operation. Olga

Sawtell, a former telecommunications associate of the government, is not holding her breath.

"A good part of the reason for the almost immediate death of home dish TVRO after the initial flurry of perhaps 2,000 pre-sold systems was the failure of Aussat (read government) to make good on their promise for additional services, beyond ABC, on satellite". Sawtell says that under the master plan, each of the 4 Australian 'Aussat Zones' was to receive ABC plus at least one independent programming (read commercial) source. That had not happened by June and under the revised-revision of the time table, it could be as late as December before the first such 'regional commercial service' was on satellite. When we talked with Olga, she projected that the 'western Australia zone would be the first to have a commercial service on Aussat to augment the ABC service.

"The truth is that many of the people purchasing an Aussat receiving system are more interested in the sub-carrier **audio** services than they are in the ABC **video** service. Radio is just as important to people who have no information or entertainment as television. It is perhaps an even more important 'first-cut' service. But the Aussat project has been so hopelessly mired in politics and dragged down by false starts that people are simply not rushing out to buy. When the promised commercial channels of service got bogged down in the bureaucratic red tape, it became another reason for people to hold off buying."

As of mid-June, Sawtell estimated there were only 2,800 Plessey B-Mac receivers in the field. Slightly more than 10% of those were in PNG, by her estimate. A mere handful were in New Zealand, as we reported in the first two parts of this report. She mentioned that Channel Master of New Zealand was one up and coming dealer network in Australia's neighbor to the east.

Sawtell's ACESAT has been led down some paths by US suppliers and while she refers fondly to the US TVRO suppliers as a whole, and speaks with admiration for the leaders in the states (she and her husband have attended several US trade shows), she has a warehouse filled with American 'dud products' she wished she had never ordered.

"We have a warehouse filled with useless antennas, shipped over here for Ku band applications" she notes. While the Australian prima-donna antenna company, Andrew, prefers smaller 2, 3 and 4 foot dishes for its Aussat service, Sawtell is in favor of the 6 to 8 foot 'American Metal Spinners' products.

"We had more than 70 antennas shipped in here for test. I suspect nobody has tested under actual Ku band conditions more antennas than we have. The AMS antennas are marginally better, we believe, than the (local) Andrew products. We use

the Andrew in the 1.5 meter class, and for everything 3.7 meters and over. In between, we fill in with the Montreal built antenna" There is a considerable price being paid here; import duties are 30% on these mid-sized spun dishes plus of course the freight charges from nearly half way around the world.

Sawtell's firm has recently completed a detailed mile by mile market analysis of the regions that could be served just in Australia with the Aussat services. She places the number of people still unserved by terrestrial TV at 350,000; or perhaps 100,000 households. By her figures, less than 3% of the market is yet served. There is another market which the government sees and which Sawtelle fears will never happen.

"The government is in a quandary trying to figure out what to do with the rural areas where there is but one terrestrial commercial channel and a companion ABC channel. If we assume that eventually there will be four separate commercial stations on Aussat, each serving its own 'zone region' with spotbeam service, now we have at least two channels of service (one ABC, one commercial) for all areas of Australia. **That** is essentially where the rural people who have terrestrial service **are today**. These are the same people, served by terrestrial TV, who have been **promised by government** that they will have three commercial channels plus ABC by 1989.

"If there were four commercial services on Aussat, what is to prevent these really rural (read outback) residents from having ABC **plus** up to **four** commercial services? Are they not entitled to at least as much service (ABC plus 3 by 1989) as the terrestrially served rural people?"

It all sounds very simple. **Unfortunately, Aussat has thought ahead on this one.** First of all, there is the zonal beam feeds of the satellite. A resident of Queensland in the northeast is not going to get very much signal from the western Australia bore-sighted beam on his 2 or 3 foot Ku band dish. ACESAT has been pushing larger antennas, in the 6 to 10 foot class, for just this reason; to insure that if the 'other problems' can be worked out, at least the TVRO dish owners will be **technically capable** of receiving zonal feeds intended for different parts of Australia.

Other problems?

"Under the presently operating system, there are four ABC feeds on Aussat; each for a different zone. When the commercial services become available, there will be one for each of the zones. But the problem here is that each channel is independently authorized and approved for each location. Even if a viewer in say Queensland has a dish big enough to pull in the Western Australia commercial fed signal, **he cannot get Aussat to**



DAVID SWALES/ has sold 10 Aussat dishes from retail outlet in Cairns, Australia.

unlock his receiver on that signal and authorize it for him. He is prevented, by the addressable nature of the B-Mac scrambling system, from gaining access to these 'out of zone' signals."

Aussat and their 'control center' keeps track of receivers by the postal codes of the owners. Sawtell thinks she sees a degree of subterfuge starting here, when the first multiple commercial signals do become available.

"Rightfully, every outback home is already penalized by its location. It seems unfair to me that a home in far northern Queensland, outside of the service of any terrestrial television, should be further penalized beyond the high cost of a dish system by being denied access to these 'other-zone' commercial signals. Even if all of our projected 100,000 home(steads) one day had dishes and had access to multiple zone commercial signals, so what? In a country of 15,000,000 people, what possible difference can 100,000 homes make?"

There is the probability that in order to 'beat the system' these rural homestead owners may in some instances acquire two or more Aussat receivers licensing one using **their own** postal code

and others using postal codes that fit other homestead owners in different parts of Australia. That is basically no different than the 300 plus systems now in PNG which on the Aussat records claim to be in Queensland.

Sawtell, who would stand to benefit if that happened because of increased sale of Plessey receivers, hopes that the authorities wake up and change the rules before this occurs. Known for her vigorous lobbying in telecommunication circles, she is working hard to change the way Aussat officials perceive the needs of rural homesteaders.

"Government people understand this problem properly," she notes, "but they worry that if this sort of thing is allowed, the rural people served by terrestrial services will opt for a satellite dish rather than support their own, local, off-air services. They worry that if there are four commercial (ie. 'super-station') signals available on Aussat, there **may be** a big boom in the ownership of home dishes in rural areas served by terrestrial TV. They are not about to repeat the 'mistake' made in America where TVROs invaded the suburbs."

Sawtell and others we talked with are not optimistic about the near-term future of TVRO in Australia. Indirectly, by carefully controlling the programming and the program authorization sequence, this is a tightly regulated industry. Aussat, and the programmers who would like to be using satellite, are locked in a battle with and through government to determine the future of television networking and broadcasting. It will not sort out easily.

Sawtell, meanwhile, believes that for ACESAT to survive and grow, it needs to be exploring other types of satellite communication services. "We know by each Wednesday afternoon exactly how the full week will shape up; we know the minimum number of systems we must ship as a distributor to stay in business. Some weeks it is tight." To get her own business moving on the faster track, she would like to create a two-way audio channel service that allows outback people to communicate, via satellite, with a central point. One of the intended uses would be for the **'School Of The Air Project'**, a shortwave radio dependent service that now allows students in rural areas to communicate with a distant teacher. Sawtell sees a satellite audio network as considerably more functional than the decades-old shortwave system which is subject to interference and outages.

"We need a system that costs no more than \$7,000 Australian which would allow these rural residents to carry on a voice grade communication with a multitude of authorities, including educators and physicians. I am spending a considerable amount of my own time meeting with engineers researching how such a system can be assembled". The system, as presently conceived, would be com-



pandered FM with large enough antennas to reduce the actual transmit power required. She would like it to be of Australian manufacture but does not rule out an imported product, at least for the electronics.

For all practical purposes, **there is no Australian TVRO market** for non-Australian suppliers. Electronics for 12 GHz in particular are foreclosed from import because the imported products do not have the ability to decode the B-Mac encryption system and without that decoding the receivers are useless. If you want to play in the Australian TVRO game, it pays to be Australian or at least have a company there.

The 4 GHz market is still alive, and well, in places such as PNG but there is a point of saturation coming in this marketplace. And, there is the soon-expected start-up of a PNG national television service which will at best present PNG regulators with serious problems concerning the future importation of TVRO hardware and allowing PNG people to continue viewing foreign television programming.

The South Pacific was a good market for a handful of suppliers for a few years time. Those days seem to have drawn to a close coincidentally at about the same time as the American and Canadian TVRO industries were faced with an 80% plus falloff in retail sales because of the confusion over scrambling. As Sawtell sees it "Indirectly, the B-Mac scrambling technology has hurt our business as well. By being able to direct specific feeds to specific receivers, the excitement and lure of wide open satellite video programming is gone. Our own marketplace is further confused by other factors as well, but we, like our American counterparts, have felt the sting of scrambling and it may be several years before we recover."

*/ US network programming is transmitted via Intelsat across the Pacific to users in Australia and elsewhere using a **split transponder/interlace technique** developed by RCA in 1980. Two video signals share the same transponder and frequency band by alternating one video 'line' from service A with a video line from service B. At the receiving end, the interlaced signals are **separated** as individual signals and used independent of one another. Equipment to create the separated signals sells from upward of \$30,000 per receiver site. Australian amateurs have developed a cut-rate approach that

allows selection of either one of the two signals independently but this technique loses exactly half of the picture content (ie. half of the lines) while the professional approach recreates the missing lines from 'above and below' (adjacent lines). A very limited number of the 'either/or' systems have been built and they carry an Australian price tag of approximately \$5,000.

**/ Scientific-Atlanta commercial receivers are also available and S-A virtually 'owns' the commercial market in Australia.

BUILD YOUR OWN CABLE SYSTEM (Part 4)

SYSTEM Economics/One

The primary objective in building a cable TV system is to make money. A properly designed, properly managed cable TV 'property' is the nearest thing to a 'cash flow machine' that you are likely to encounter in business. The income stream is predictable within a few percentile points for months and years in advance. So too, is the overhead or cost of operation. Paper modeling of system 'cash flow' performance is relatively straight forward and quite easily explained for a prospective investor or banker. There are now thousands of cable systems in operation and bankers and others can easily locate other operational models to compare to your 'paper model' to verify the accuracy of your projected income and overhead. In short, **cable systems are very 'bankable'**.

A cable system is capital intensive on the 'front end'; significant outlays of cash are required up front during the construction phase. By the same token, when compared to the heavy up front costs there are virtually no ongoing operational expenses associated with the smaller sized cable systems we are describing in this series. Therefore the economics of cable boils down to:

- 1) Know how much the cable system will cost to build,
- 2) Know what the anticipated revenues of the system will be,
- 3) Factor in the modest monthly operational

expenses,

- 4) Create a paper model based upon expected revenues **less** monthly operational costs to determine the 'cash flow' remaining which is then used to retire the debt (up front building costs) of the system.

It is just that simple!

Upfront Costs

We have two major 'sections' to the system; the cable plant itself (consisting of the cable, line amplifiers, power supplies, passive components and hardware), and, we have the 'headend'. The headend portion consists of the receiving antennas, the received-channels processing equipment, any local 'origination' equipment for programming created by the cable system itself, and powering protection equipment to insure that the headend equipment does not malfunction when the AC power service 'glitches'.

We will deal with the mechanics of equipment selection and the techniques associated with properly installing the equipment in a subsequent installment(s). First, however, you need to be aware of what sort of 'community' is viable for cable, and how you go about obtaining 'permission' (ie. franchise) to build and operate a system there. Here are some rules-of-thumb which will serve you well as you are contemplating various cable community opportunities in the weeks and months ahead.

- 1) The cable plant will average between \$4,500 and \$6,000 per cable-plant-mile. A cable plant mile is simply a mile on the ground along which the cable system will 'run' or be installed. This assumes that we are dealing with a small community that is best described as rural in nature, that there are existing utility (power or power and telephone) poles in place and after suitable study, you do - or directly oversee the construction yourself.
- 2) The cable headend is more difficult to generalize because of the great variety of possible 'input' channel services to the system. Locally transmitted VHF and UHF channels can be processed into the cable system for approximately \$700 each for VHF channels and \$900

each for UHF channels. If the 'local' signals are some distance away and require large-tall off-air antennas to capture, the cost per channel can increase dramatically. At tower heights up to 100 feet or so, Rohn 25G and 45G type towers will usually be adequate if you are not planning to suspend too many antennas on the tower(s). This works out to around \$10 to \$14 per foot, installed. Beyond 100 feet, towers become small buildings with comparable costs; a 300 foot tower with suitable guying can cost you \$25,000 installed.

We will assume for this exercise that your off-air VHF and UHF signals are truly local, and that you can do all you need to do with a tower no more than 100 feet in size.

The majority of your signals will come from satellite. That is why we are here in the first place! So let's create a paper model 12 channel cable system using **two local signals** and then a selection of satellite signals to complete the package.

Networks?

No question, most people want the three primary network signals **first**. In our paper model we are going to assume that we have one PBS station and one NBC station locally in our to-be-cabled community. **Everything else will come off of satellite.**

- 1) CBS and ABC can come from satellite and in the likelihood that Prime-Time 24 does launch and stay on Galaxy 3 with all the three of the network signals, we have one of each available. In our example we will carry all three of **these** network signals, **plus** our local NBC and PBS affiliates. This involves one Galaxy3 dish, three receivers, three modulators, plus the off-air processing equipment for the two 'local' signals. Assuming a 12 foot dish, and either USS/Maspro receivers and frequency agile modulators, or the all-in-one package from Electrohome, we will average \$1,700 per channel for the off satellite channels (shared cost of 12 foot dish plus individual electronics for each channel).
- 2) One dish on F3R to process MTV and The Weather Channel. With a 12 foot dish we will have an average cost per processed channel of \$2,100.
- 3) One dish on Galaxy 1 to process Showtime, WTBS, Disney, ESPN and CNN. Again, assuming a 12 foot dish dedicated to G1, we have a shared cost per channel of \$1,650 per channel.

Our 12 channels are now ready for cable carriage at a total cost of \$1,600 (two local signals), plus \$5,100 for the Galaxy 3 signals, plus, \$4,200 for the F3R signals, plus, \$6,600 for the Galaxy 1 channels. That is a combined cost of \$17,500 (\$1,458 per channel on average). Now we have

MODEL SYSTEM Channel Line-Up

Channel	Service
2	Showtime
3	WGN
4	WTBS
5	Disney
6	MTV
7	ESPN
8	Weather Channel
9	NBC Satellite
10	ABC Satellite
11	NBC Local
12	CBS Satellite
13	PBS Local

to house the equipment someplace and protect it against undesirable power outages and power line 'spikes' and 'transients'. We'll assume you can rent or provide a place for the equipment and antennas for \$200 per month, and pick up that expense later on as a monthly overhead item. The electrical protection will add \$500 to the total headend cost. So we will round out the per channel average to \$1,500 each.

Modeling

We will plan to build a cable plant that is 9 cable miles long, at an average cost of \$5,400 per mile. That then becomes a plant investment \$48,600 plus a headend investment of \$18,000. It comes to \$66,600 total cost.

In a major city, 9 miles of plant might well 'pass by' 9,000 potential cable residences. We are dealing with a presently uncabled 'rural' town, however, and a more realistic potential is 30 homes per cable mile. We have a total home count of 270. So one way to look at this is to divide the total cost of the system (\$66,600) by the number of potential homes in the community. That works out to \$246.66 per home.

Unfortunately for you and all other cable operators, you cannot expect 100% of the homes to subscribe to the cable service. Over time, you can anticipate that 50% of the available homes will subscribe by a certain projected date (say 3 years from system turn on) with the system eventually selling service to 70% of the homes (at the end of five years). We make the assumption here that without cable, residents in this community are limited to only PBS and NBC reception, and that cable will therefore fill out the missing networks as well as provide additional services. When you have a community that is missing one or more of the three commercial network services, your cable-penetration rate (percentage of homes sub-

COOP'S
SATELLITE
DIGEST

GREEN SHEETS

A MONTHLY trader's forum allowing industry promotion for surplus, outmoded and hard to find equipment.

THIS segment of CSD functions as an international buy/sell/swap and trade forum for equipment related to TVRO, cable, and (low power) broadcasting. **Subscribers** to CSD are allowed one **FREE listing** in Green Sheets per subscription year (forms to submit copy available upon request). Subscribers are also allowed additional listings at a discounted rate of **\$25 per listing**. Display advertisers in CSD are allowed unlimited use of Green Sheets at a rate of **\$20 per listing**. All others are charged **\$35 per listing**; all orders must have payment enclosed, no invoicing or billing (you may **charge your listing** to your VISA or Mastercharge however). All Green Sheets listings are carried for a single month with a 100% 'roll-over' on the 1st of each month. **Deadlines:** 1st of month for that (current) month's listings. A 'full' listing consists of **120 letters, numbers and spaces** between words or numbers. Print or type all listings submitted; over-long listings will be rejected or edited by CSD. CSD provides this service without responsibility for the character of the listings and cannot validate the integrity of the listings or listers; Caveat Emptor! **Submit listings** to CSD, P. O. Box 100858, Ft. Lauderdale, FL 33310 or **call in listings** not later than 1st of month to **305/771-0505** between 9AM and 4PM eastern; have VISA or Mastercharge card handy when calling.

ANTENNAS
CABLES

No listing this issue

DESCRAMBLERS

CABLE AND SATELLITE DESCRAMBLERS - S.A.T. ENGINEERING. CALL FOR FREE CATALOG 1-(800) 255 9500 EXT. 763. OAK CHIP SETS - \$150.00

FEEDS

LNAs/C BAND

LNBS/C and Ku BANDS

MOTOR DRIVES/Controllers

RECEIVERS/C-Ku for SCPC

No listing this issue

RECEIVERS/C-Ku for VIDEO

LUXOR 9550/9554 COMBO WITH 18 INCH ARM AND DOWNCONVERTOR UNUSED UN BOX \$350.00. ALSO COMPUTERS AT TREMENDOUS DISCOUNTS. AWM AMERICAN MICROS (404) 964 2253

AVCOM 2-A RECEIVERS/THE TOP OF THE LINE CHOICE FOR FRINGE AREA RECEPTION SUCH AS CARIBBEAN. EQUIPPED WITH WIDE/NARROW AUDIO FILTERING, PROSAT ACTUATOR INTERFACE AND POLAROTOR 11 INTERFACE. THIS IS THE BEST HOME RECEIVER FOR CARIBBEAN AND OTHER WEAK SIGNAL AREAS. SPECIAL PRICE OF \$399 EACH PLUS YOU RECEIVE BONUS OF AVCOM PSA-35 1 HR VIDEOTAPE TRAINING TAPE EXPLAINING FULL OPERATION AND USE OF SPECTRUM ANALYZER. THIS \$100 TAPE IS YOURS AS A FREE BONUS; LEARN ALL ABOUT SPECTRUM ANALYZERS FREE OF CHARGE! ONLY 10 RECEIVERS AVAILABLE AT THIS PRICE; CHECK OR MONEY ORDER ONLY; (NO INVOICING) AND INSTANT SHIPMENT. SAVE \$100 ON THIS SPECIAL PACKAGE PRICE! DIRECT FROM CSD MAGAZINE, PO BOX 100858, FT. LAUDERDALE, FL. 33310. (305) 771 0505.

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2 USED AVCOM-3 RECEIVERS \$300.00. NORSAT TWEAKER \$40.00. NEW BLONDER TONGUE MU 657 \$180.00. (816) 665 6044 E. RAY, BOX 947, KIRKSVILLE, MO. 63501.

CUSTOM LOAD AND RUN CHIPS FOR INTERSAT 10-160, REPAIR. LESLIE ENGINEERING, RTE 3 BOX 146, ALBION, IL. 62806. (618) 445 2269

AVCOM 3 RECEIVER CONVERTED TO 3R (REMOTE CONTROL) FACTORY REFURBISHED - REM DOWNCONVERTER - WORKS GREAT. FOR SALE/TRADE - STEVE (405) 722 2941

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SOFTWARE/Programming Services

S/TMC/HBO/CINE/CNN 1/800-528-DISH

SHOWTIME/THE MOVIE CHANNEL 1/800722 8226; 1/800-422-9000

CNN 1/404-447-6302

CNN TROUBLE LINE 1/800-344-6754

NOSTALGIA CHANNEL FREE DECODER 214-869-4996

FIRST RUN MOVIES 1/800-523-7150

PRIME TIME 24 NETWORK SERVICE 1/212-725-1132

PQRS, LTD SEEK TO TRANSMIT SPORTS FROM USA & CANADA. SOCCER, HOCKEY & MORE. CONTACT:
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TEST EQUIPMENT

TEKTRONIX MODEL 547 DUAL TRACE SCOPE WITH 10-4200 MHZ
SPECTRUM ANALYZER PLUG-IN MODULE. \$1,475 - FOB
JOHN WILSON (804) 862 1262.

Danex 6' Antenna \$99

Danex 7'4" Antenna \$149

Alcoa 6' Antenna w/patio mount \$169

Prostar XR-1 Receiver \$229

M/A-Com LNB \$59

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NATIONAL SATELLITE COMMUNICATIONS

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1-305-851-4738 (FLORIDA)

AVCOM PSA-35A SPECTRUM ANALYZERS IN FACTORY SEALED CARTONS. THESE ARE THE NEW 'A' VERSIONS WITH EXPANDED 2dB PER DIVISION VERTICAL SCALE FOR MAXIMUM SENSITIVITY. IMMEDIATE DELIVERY FROM STOCK, FULL FACTORY WARRANTY. TEN ONLY AVAILABLE; ORDER PRIOR TO SEPT 10th AND RECEIVE AVCOM 2A RECEIVER (\$399 VALUE) WITH FULL OPTIONS AS NO CHARGE BONUS. EACH ANALYZER INCLUDES 1 HR TRAINING VIDEOTAPE PREPARED BY COOP (THE SPECIAL UNPURGED 'CAPTAIN MIDNIGHT VERSION' BANNED IN VA!) WITH A RETAIL VALUE OF \$100. DIRECT FROM CSD, PO BOX 100858, FT LAUDERDALE, FL. 33310. FULL PRICE \$1965 (CHECK OR MONEY ORDER ONLY; NO INVOICING) AND INSTANT SHIPMENT. SAVE \$499 ON THIS SPECIAL PACKAGE PRICE!

900-1450 SWEEP GENERATORS/AVCOM MSG-1450 SWEEP 900-1450 MHz WITH LED READOUT TO 1 MHz OF SIGNALS DISPLAYED. PERFECT TOOL FOR TEST AND ALIGNMENT OF BLOCK IF RECEIVERS AND SYSTEMS; INTERNAL OR EXTERNAL VIDEO MODULATION. ALSO GREAT FOR READING OUT TI FREQUENCIES FOR FILTERS. 110 VAC OR INTERNAL BATTERY OPERATION. CHECK OR MONEY ORDER, \$825 EACH INCLUDES FREE \$100 BONUS PSA-35 SPECTRUM ANALYZER TRAINING TAPE. ORDER DIRECT FROM CSD MAGAZINE, PO BOX 100858, FORT LAUDERDALE, FL. 33310. (305) 771 0505.

MICROWAVE SWEEP GENERATORS/AVCOM MSG-5 UNITS SWEEP 3.7 TO 4.2 GHz WITH LED FREQUENCY READOUT TO NEAREST 1 MHz. BATTERY OPERATION PLUS AC, ALLOWS TEST OF C BAND LNAs & DOWNCONVERTERS PLUS EXTREMELY USEFUL IN PIN-POINTING EXACT FREQUENCY OF TI CARRIERS. BRAND NEW, FACTORY CARTONS. FREE \$100 BONUS; RECEIVE AVCOM PSA-35 SPECTRUM ANALYZER TRAINING TAPE, ONE HOUR, \$100 VALUE WITH EACH MSG-5. CHECK OR MONEY ORDER, \$900 EACH DIRECT TO CSD MAGAZINE, PO BOX 100858, FT. LAUDERDALE, FL. 33310. (305) 771 0505.

TWEAKER 11 (NEW) RANGE 50 MHZ TO 1500 MHZ - NEW \$400 SELL \$125. WOMACK SYSTEMS, BOX 35027, DALLAS, TX. 75235. (214) 357 3871.

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OFF-SHORE FOUR CHANNEL TV BROADCASTING SYSTEM, PACKAGE INCLUDES 4 TEN WATT UHF TRANSMITTERS IN 410-470 MHz REGION (12 MHz SPACED CHANNEL TO CHANNEL) WITH 50 UHF TO VHF CONVERTERS. BASEBAND VIDEO AND AUDIO TO TRANSMITTERS PRODUCES HIGH QUALITY PICTURES WITH DIRECTIONAL TRANSMIT ANTENNAS TO 10 MILES OR MORE LINE OF SIGHT. ORIGINAL COST OVER \$8,000; \$4,200 FOB FORT LAUDERDALE, AVAILABLE NOVEMBER 1ST. CONTACT ALLI LAKE AT CSD MAGAZINE, PO BOX 100858, FORT LAUDERDALE, FL. 33310.

BIG TIME VHF CHANNEL 4/PROFESSIONAL BENCO (OF CANADA) RACK MOUNTING 10 WATT PEAK SYNC CHANNEL 7 INPUT/ CHANNEL 4 OUTPUT TRANSVERTER/TRANSMITTER WITH INTERNAL POWER SUPPLY (117 VAC). THIS IS THE ULTIMATE QUALITY 10 WATT TRANSMITTING PACKAGE, BUILT-IN COOLING, LIST PRICE OVER \$4,500. IN SERVICE NOW, OPERATIONAL 4 YRS WITHOUT FAILURE. REPLACING WITH CABLE TV SERVICE IN CARIBBEAN. PRICE \$2,200 FOB FT. LAUDERDALE. CHECK OR MONEY ORDER DIRECT TO CSD MAGAZINE, PO BOX 100858, FT. LAUDERDALE, FL. 33310. (305) 771 0505.

INSTANT VHF CHANNEL 4 TRANSMITTER/GO ON AIR WITH PROFESSIONAL LOOKING 10 WATT OUTPUT VHF CHANNEL 4 SERVICE BY CONNECTING YOUR OWN VHF MODULATOR ON CHANNEL 7 TO THIS MAGIC UNIT BUILT BY KEITH ANDERSON. 'TRANSVERTER/AMPLIFIER' ACCEPTS 0 dBmV OR GREATER

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**FACTORY SEALED
CARTONS:
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**\$399 EACH
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**CSD (Direct) P.O. Box 100858
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(305/771-0505) Quantities limited at this price.**

NOTICE: TVRO DEALERS

H.D. and John McCullough would like for you to know that they are still in business, and have been since 1980

But it seems that a lot of people simply like the way our receivers perform... — and keep on working — year after year (even with L-O-N-G cable runs!).

So when they want something they can really count on, they often use a McCullough receiver. (They should work OK, after all, each receiver is tested, cooked a couple of days then tested again after final assembly)

And have an order shipped the same day it arrives...

And deal with just plain folks who do what they say they will do.

---- SO NOW, CONSIDER THIS ----

Scrambling didn't stop TVRO, tho it slowed it down a lot. Temporarily.
(Prices for programming will come down a lot)

And the era of satellite communications is just beginning.

Let us help you enter this new era with;

- 4/12 GHz receivers
- Affordable Single Carrier per Channel (SCPC)
- Teletext decoders
- European band receivers
- Real bargains in LNA's and accessories

Call or write for complete information;

McCULLOUGH SATELLITE EQUIPMENT, INC.

Route 5, Box 97
Salem, Arkansas 72576
Phone: 501-895-3167
or 895-3318

NO CATEGORY/Too Late To Classify

5 YR EXPERIENCED DEALER MOVING TO BAHAMAS/CARIBBEAN.
SEEK TO BUY DEALER PARTNER OR WORK IN AREA. CALL
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IF PROBLEM - CALL US. WE HAVE ALL THE EQUIPMENT
NECESSARY TO DIAGNOSE AND CURE YOUR T.I. PROBLEMS
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CSD BACK ISSUES \$7.00 EACH. 8/80 TO PRESENT.
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REPAIR ALL OTHER MAKES. E.M.C., INC. CALL :-
(414 284 6363 OR (800) 336 7506.

HOW TO PLACE A GREEN SHEET LISTING: if you wish to have a product or service listed in the next issue of **CSD Green Sheets**, do the following:

- 1) Save your mailing label for CSD. You are entitled to one **free** Green Sheet listing per year with your CSD subscription; no charge! Your mailing label is proof of your subscription and it saves Carol time in checking on you.
- 2) Paste the CSD addressing label on the form here as **proof** of your subscription.
- 3) Each listing is a maximum of 120 letters, numbers AND spaces (**spaces** are between numbers and letters and words), long. There are dashed lines below which correspond to those 120 letters, numbers and spaces. Fill the form out with your listing, one of 'each' per dashed line (after a little practice you may actually grow to enjoy this!).
- 4) If you are a subscriber and this is your **first listing** for your current subscription, **send no money**. That's right-just fill it out (with label) and mail in.
- 5) If you are a subscriber and this is your **second** (etc.) **listing** for the current subscription year, **enclose \$25** per listing.
- 6) If you are a **DISPLAY** advertiser in CSD currently, your cost is \$20 per listing. Enclose payment with listing(s).
- 7) If you are **not** a CSD subscriber, **shame on you**. For this oversight on your part, enclose **\$35 per listing** and may your Vidare dish take on a permanent warp in the shape of a Ruffles potato chip.
- 8) Mail this form, **your payment**, and anything else you think Coop might like to **CSD Green Sheets, P.O. Box 100858, Ft. Lauderdale, FL 33310**. OR, drive Carol bananas by **telephoning 305/771-0505** between 9 AM and 4 PM weekdays eastern time and have your VISA or Mastercharge card handy along with your carefully worded listing.
- 9) Listings that run beyond 120 letters/numbers/spaces will be edited to size by Alli Lake (aka 'Alli The Ax') and neither Alli nor CSD are responsible, legally, financially, nor morally for how your listing is butchered in the process (avoid butchered listings; count to 120 carefully).

CSD SUBSCRIBERS ATTENTION!

YOU ARE ENTITLED TO ONE FREE
CSD-GREEN-SHEETS LISTING
PER-YEAR AS A CSD SUBSCRIBER.

ATTACH CSD MAILING LABEL
HERE
AS PROOF OF SUBSCRIPTION

CABLE TV/ Continued from page 20

scribing) will always be higher.

Having a good grasp on how many homes will subscribe, and when, is an important part of paper-planning a system. **You need to know this with some accuracy** to calculate how long it will take you to pay off the original \$66,600 spent to build the system. Your banker or investors will ask that question, quickly!

So we have **some** established parameters. We need a few more before we can do cash flow computations; ie. how we pay off the upfront debt. For example, how much will we charge for the cable service?

Notice in our proposed channel table we have two premium channels available; Showtime (channel 2) and Disney (channel 5). These will be optional, extra channels. That leaves us with 10 channels to sell on 'cable-basic'. What is a fair price for these 10 basic channels? The answer is someplace between \$9 and \$15 per month, depending upon where your system is located and what people pay for cable in surrounding communities. We'll make an assumption here for computation and charge \$12 per month. Then we also need to know what percentage of homes will subscribe to either Showtime or Disney, or both. With two diverse channels available, we can anticipate each home will take **at least one** of these two services. If these services cable-retail for \$9 per month each, the cable system will retain half of that or \$4.50 per month. So to the \$12 per month we sell basic service for, we add \$4.50 per home for the cable system **share** of the premium service. Now we have a gross income of \$16.50 per home, **per month**. And the more detailed calculations can proceed.

Given the lack of full network service in our model community, one can anticipate a higher-than-average early subscription response. Given the mode circumstances here, 50% hook up during the first year would not be unusual. **We'll down play that however**, for the purposes of our example and assume only 30% will subscribe during the first 12 months. Then we will add 10% per year, giving us **40%** subscription penetration at the end of year two and **50%** at the end of year three. We will carry this out to years four (**60%**) and five (**70%**) where we will freeze the growth.

When you are doing your own projections, it is far better to make your estimated income low since your bank or investor loan(s) will be tied to those projections. If you can survive, financially, with lower subscription percentages, then doing better will only make your life easier. If your bank is astute, they may suggest to you that your projections could be low and they may try to use this as 'leverage' to get you to pay more per month to pay

MODEL CABLE SYSTEM CASH FLOW/Years 1 to 5

- 1) Subscriber potential: **270**
- 2) Average gross income per month, per subscriber: **\$16.50**
- 3) Penetration percentage: 30% year 1, rising 10% per year to 70% year 5.
- 4) Monthly operating overhead:
 - A) Headend rental: \$200
 - B) Electricity: \$180
 - C) Pole rental (24 poles per mile, \$5 per pole per year, 216 poles total or \$1080): \$90
 - D) Insurance: \$150
 - E) Office overhead (shared with another business, on basis of part-time requirements): \$300 per month
 - F) Vehicle and maintenance expense: \$200
 - G) Installer/maintenance personnel: \$00.00 (**that is you!**)
 - H) Miscellaneous: (includes franchise fee, if any, undefined operational expenses): \$200

Total Monthly Overhead: **\$1,320 per month**

Year/ Month	Sub Income \$\$	Operating \$\$	Cash Flow Remaining
1/1	\$660	\$1320	(-) \$660
1/6	\$1105	\$1320	(-) \$215
1/12	\$1336	\$1320	\$ 16
2/6	\$1551	\$1320	\$231
2/12	\$1782	\$1320	\$462
3/6	\$1996	\$1320	\$676
3/12	\$2227	\$1320	\$907
4/6	\$2442	\$1320	\$1122
4/12	\$2673	\$1320	\$1353
5/6	\$2887	\$1320	\$1567
5/12	\$3118	\$1320	\$1798

off the initial loan. So be prepared for that one!

The calculation table. This is a cable cash flow projection and it lays out what you anticipate in receipts against what you anticipate in expenses. The bottom line is 'how much money is left each month' to pay off the initial seed money, and hopefully provide some financial reward along the way for you?

There may be a certain amount of discouragement in our **Model Cash Flow Table**. It does not appear that anyone is going to get rich, fast, here! Can we, in fact, even pay off our bank or seed money debt of \$66,600 given these projections?

First look at the smaller table titled '**Penetration Percentage Growth**'. This tells us what percent of homes subscribed by various points in our cash flow table. Note that we started off with 15% subscribing and **grew to 30%** at the end of year one. Also notice that **we projected losing money** before we repay any bank debt for most of year one. If this was the actual situation, we would have to increase our initial investment of \$66,600 by enough to pay off our first year losses. We will return to this point shortly.

Given what is here, can we pay off a \$66,600 seed money investment in five years (60 months)?

The system is generating 'excess cash flow'

PENETRATION PERCENTAGE GROWTH/Start Slow

Year/Month	% Penetration	Number Subscribers
1/1	15%	40
1/6	25%	67
1/12	30%	81
2/6	35%	94
2/12	40%	108
3/6	45%	121
3/12	50%	135
4/6	55%	148
4/12	60%	162
5/6	65%	175
5/12	70%	189

PENETRATION PERCENTAGE GROWTH/Start Fast

Year/Month	% Penetration	Number Subscribers
1/1	50%	135
1/6	52%	140
1/12	54%	146
2/6	55%	148
2/12	57%	154
3/6	60%	162
3/12	61%	165
4/6	62%	167
4/12	64%	173
5/6	67%	181
5/12	70%	189

(above \$1,320 operating expenses) in month 12. A whopping \$16 to be precise. With subscriber growth the system excess cash flow expands to \$1,798 per month in 60. If you calculate how much cash, above the \$1,320 per month it takes to operate the system, is generated **between months 12 and 60**, it comes to **\$48,646**. To that we would also need to add the 'losses' in months 1 through 11. It is apparent that in our model system, we are short no less than \$22,000 to get it started. And that is with no 'interest' being paid on the original seed money and **no income at all for you**, the guy doing all of the work. Not a good deal? Perhaps.

Suppose you went to the community and said 'Ok, I will build a modern 12 channel cable system here BUT only after 50% of the homes have agreed to take the service'. That would mean that you would start off with half of 270 homes the first month and then over 60 months it would gradually grow to 70% of the homes. In effect, by being a good salesman you can preload the system in front and realize much higher cash flows starting with month one. A second **Model Cash Flow Table** appears here to reflect the impact of this. A smaller table shows the percentages of subscription along the way.

Well, from our second model we can at least see that we are not losing money in the early months. During the first five full years, this system now generates **\$81,720** in excess cash flow, above and beyond the \$1,320 per month required to operate the system. If you borrowed the entire \$66,600 required to build the system, and paid it back in 60 equal installments of \$1,110 per month **plus interest**, your system would just about break even (ie. pay itself off) in 60 months time. The key here was being able to **start with 50%** of the homes paying for the service and not the original 15%. But, this still gives you five years of hard work for very little or no pay yourself. **Is that such a good deal?**

We are a victim here of our own numbers. For

example, we have selected a small community requiring 9 miles of cable but offering only 30 homes per cable mile, average. If you had **more potential homes** per mile and could still attain 70% penetration after 5 years of operation, your cash flow would improve accordingly. If you charged more than \$12 for basic cable or more than \$9 (\$4.50 to you) for the premium channels offered, your cash flow would improve. If you could cut the \$5,400 per mile initial plant cost by \$1,000 per mile, your debt would decrease and your cash flow would improve. In short, **you** have a measure of control over the cash flow here.

But, let us assume that the numbers in our second calculation (starting off with 50% penetration rather than 15% penetration) **are accurate** and this is the best you can hope for. Can you, will you work your fanny off for five years just to pay off a bank loan and not realize **any** real income for yourself? Believe it or not, you should and here is why.

Now you are 70% cable penetrated and you have \$1,798 left each month. All of that goes into your pocket. In a year's time, you will pocket \$21,576 in net revenues to yourself. **In ten years** time you will earn \$215,760 in net revenues to yourself. In ten years time you will **earn** \$215,760 in revenues from this very small **189** subscriber cable system.

Yes, it is getting more interesting.

To enter the cable business with this sort of program requires a **ten year or longer commitment** to a business plan. This means **you decide** you will work at it long enough to realize the inevitable profits built into such a system. A person holding down a fulltime job with weekends off could handle this as a sideline business. A fellow in business for himself (such as selling TVROs) would find this a comfortable side business.

Now, if you can batch several of these small systems together in fairly close physical proximity to one another, you have the ability to combine some of the overhead items and increase your

50% START-UP/Revised Chart

Year/Month	Sub Income \$\$	Operating \$\$	Cash Flow Remaining
1/1	\$2227	\$1320	\$907
1/6	\$2310	\$1320	\$990
1/12	\$2409	\$1320	\$1089
2/6	\$2459	\$1320	\$1139
2/12	\$2541	\$1320	\$1221
3/6	\$2673	\$1320	\$1353
3/12	\$2722	\$1320	\$1402
4/6	\$2756	\$1320	\$1436
4/12	\$2855	\$1320	\$1525
5/6	\$2987	\$1320	\$1667
5/12	\$3118	\$1320	\$1798

cash flow on the whole 'package' of small systems. Plus, once you have demonstrated to the bank or investors that you can make such a system work, you will find getting funding on the second (etc.) systems comes much easier. That's where **'leverage'** comes in.

The presumption is that you raised the initial capital to build the first system by using something other than the unbuilt cable system as **'collateral'**. Perhaps you sell off 'shares' to private investors. If you have a 10 to 15 year 'business plan', it is far better to arrange the financing on the first system so you end up with voting control of the corporation, as we shall see. In other words, **take more of the risk yourself** in exchange for holding onto more of the control of the company.

Once your first system is in and running, and you have learned enough about the business to be considered experienced, now you have a new option available; using the first system as 'collateral' or **'leverage' to finance the second system**. To pull this off, you have to control the company yourself so you can vote to do this and not get hung up with other investors who want to stop after a single system.

Cable systems have value, even when they are not completely paid for. There is an active marketplace in buying and selling cable TV systems. If you are an old time reader of **CSD**, you already know that on the open market a cable system sells for around \$1,000 per subscriber. This number begs some explanation.

A system is worth what you can get for it. The actual price is determined by how much money the buyer can take out of it since the buyer is only really interested in the 'cash flow' he will receive from the system. The most common way to improve an existing system's cash flow is to combine technical and management talents so that as many systems as possible are operated with as few people involved as possible. A small system with 189 subscribers stuck out by itself twenty miles

from any other cable system is not going to be inexpensive to operate. On the other hand, if the small system is just beyond the normal reach of a larger system, or is in close proximity to several other smaller systems which could be operated 'together', then the economics of the systems become much better.

It follows then that your business plan should not involve building and operating multiple systems **unless** these systems are located where one set of technical and management personnel can run the systems on a day to day basis. A small system with 189 subscribers, located all by itself may **only** be 'worth' \$600 a subscriber because of its difficult to-get-to location. The same system, surrounded by four or five similar sized small systems that could be operated as a group could be worth **as much as** \$1,000 per subscriber in today's marketplace.

So it pays to plan ahead, to look for 'clusters' of small communities or developments likely to be built around resort lakes or other as-of-yet undeveloped projects which could work together.

The leverage aspect.

Perhaps the bank turned you down on the first system. You may be incensed at this and be tempted to tell the banker what a fool he is not to invest in you. **Curtail that impulse**; if you are planning additional systems in the future, you may need that banker to help you finance a later system.

Once your first system is in, and you have proven that you can do it for the original budget and attract the customers which you had set as a projected minimum, **now you have leverage**. And that is because of the 'selling power' of the first system. To raise money for the second system **you go back to the bank with a proposal**. Offer them a **mortgage on the first system** to raise the money you need for the second. On the surface that may sound ludicrous; you owe money on the amount borrowed for system one, and every cent you are taking in is being used to operate the sys-

tem and pay back the loan for the first system. So how could you expect a bank (investor) to loan you money on that system?

Because it has value, in the marketplace. Your first system financing was raised without encumbering the system itself; partly because the banker would not accept the unbuilt system as mortgage collateral. He wanted something he understood better, such as your house, for collateral. Fine; now we have the demonstrated value of system-one to mortgage.

The trick is to convince the banker that your first system has value; a study of your books and the cable TV marketplace will do this. Let's say you have 150 subscribers at this point and the **minimum value** of these subscribers is \$600 each. That means you have 150 times \$600 or **\$90,000 in new leverage available**. If it cost you \$66,600 to build the first 9 mile long system to serve 270 potential homes, it follows that with \$90,000 available you could build a system 40% bigger to serve even more potential homes.

And the process repeats, all of course, based upon your continued ability to do what you say you will do for the price you say it will cost and with the sales results you are projecting.

Ten Years Later

At some point you have exhausted an area of cable-possible communities. No, there are not that many good, even small, communities left. The

cable 'boom' of the 60s and early 70s uncovered most of the **obvious** cable situations. Many of those left are in pockets, surrounded by cable, where the housing density was too low (ie. too few homes per cable mile) to attract the interest and attention of the larger cable operators. Many of the present day opportunities are tied to the new construction of condo communities; when you drop 100 or 200 new condo units along the shore of a resort lake where previously there were only 50 homes, you change the cable-potential of the area rapidly. A new hotel or trailer park going into a 'virgin area' may also signal a new cable opportunity; **without** the new project the housing density is too low to provide a suitable foundation. **With** the project, perhaps you can start out as a SMATV providing for the new trailer park (hotel) and then reserve the contract right to take lines **out of that development** to serve other nearby single family homes. There are many new opportunities every day; the trick is to be alert enough to catch them before somebody else does.

OFF Shore

While the major cable opportunities in the United States (and Canada) have been already found and built, there are still thousands of potential locations for cable in Central America and the Caribbean. **But**, each such opportunity presents unique problems for a foreign owner/operator and we will address those problems in a subsequent segment of this series.

'MY VIEW'

by Peter C. Sutro

Associate Editor/CSD

We Americans are constantly reading and hearing about the U.S. balance-of-payments problems in foreign trade and what a huge negative impact this has on our economy. Since the end of World War II we have seen the ability of our industry, once considered to be the most advanced in the world, deteriorate to such an

extent that it could no longer compete on the world markets. It has now further deteriorated to an extent that, in many areas, it can no longer compete in its own domestic markets. I was in Japan from 1954 to 1956 and if someone had suggested to me at that time that the war-shattered Japanese would someday give our automotive and electronics industries nightmares I would have considered it a bad joke.

I bring this up because I recently spent over a month in Italy and was able to witness our ineptness in several areas personally. First of all, let me cite an area which has hampered our satellite industry since the beginning. The **U.S. Department of Commerce** requires that exporters of satellite equipment obtain an export license before shipping microwave electronics, feed-horns and other related **receiving** equipment out of the U.S. This is due to a Defense Department perception that any equipment in the microwave range of frequencies is sensitive and could be used by the Russians against us. Consider the fact that the U.S.S.R. has very sophisticated satellite systems relaying television to all parts of the globe. Consider, moreover, that much of the equipment which we could be exporting is made in whole or in part in the Orient and you will understand how ridiculous these regulations and re-

strictions are.

What is more, if you do go through the cumbersome process of applying for an export license to, say, Italy, you will receive, after a 6 - 8 week wait, an answer from the Department of Commerce telling you that, before they can issue you an **export** license, you must receive an **import** license from the Italian government. The Italian government's **reply** to your request is that **they do not require an import license** for this type of material and, therefore, will not issue one. So you are really in a Catch-22 situation where all you can do is break the U.S. Law and take your chances, or give up trying to do any export business. **No wonder we have a balance-of-payments problem!**

I recently attended a huge electronics show in Milan, Italy, comparable in size and quality to our CES. As a rough guess, no more than 10% of the high-technology equipment on display was of U.S. origin while the rest was equally divided between European and Oriental manufacture. I had an eye-opening experience while shopping at the show for a portable 10-12" color TV monitor to use for satellite testing. I fell in love with a beautifully styled set from Brion-Vega but the \$700 price tag seemed a bit steep. Someone recommended that I consider a 10" infrared, color monitor named 'Hyper' which sold for about half the price, and made in Italy. I bought one off the show floor and when I unpacked it, there across the back was a sticker "**Made in USSR**"! Although the instructions were a bit rough, it worked very well and I spent the next three weeks watching CNN Headline News on a Soviet TV set, using a 32" dish (made in the U.S.A.), an Echostar LNB (made in Taiwan) and an Echostar 3000E receiver (Made in Korea). The U.S. made **dish** represented about 3% of the total cost of the system.

While on the subject of CNN Headline News, I would like to send this message to Ted Turner: "You launched your service to Europe on October 1, 1985 with the avowed purpose of bringing, for the first time, U.S. style news to European audiences. You are using a transponder on Intelsat V-11 and its powerful Ku-Band signal can be received over most of Europe on a 3 foot antenna and even as far from the center of the footprint as Greece, Turkey, Israel and North Africa using a 5 to 6 footer. You are losing a reported \$10 million a year to maintain this service for a few paying (and many non-paying) hotels and a smattering of TVRO owners. I watched it over a three-week period and found it **infinitely worse** than its U.S. counterpart. I'll give you an example: On **September 17** an announcement on "European Newscast" read:

INTERNATIONAL FESTIVALS - EUROPE

September 7 - Gondola Regatta - Venice

September 7 - Joust of the Caracew - Arezzo

Aside from the fact that "Caracew" should have read "Saracen", who cares about events which took place ten days **before** the telecast? The next item which was covered at great length was about a typhoid scare at a McDonalds in Maryland followed by an exercise class and a lesson in Cajun cooking. This for Americans staying in a posh hotel in Europe? Ted, if this is the best you can do, you should save your money!"

This is an example of America's ineptness in exporting **software**, but there is another issue here. Recently, Orbita Technologies of New York City announced that

they had signed an agreement with Gostelradio, the State Television Industry of the Soviet Union to license learning institutions in the U.S. to receive internal Soviet television broadcasts. One wonders whether such a license would be granted to learning institutions in Western Europe by CNN or, for that matter AFRTS. We doubt it very much.

We Americans also tend to put roadblocks in the way of business by making absurd demands on payment terms. We are paranoid about our customers wanting to rob us at every turn - where, in fact, the opposite is too often true. I have seen U.S. companies insist on payment for an order **before** they will ship one piece of equipment. Irrevocable letters of credit are acceptable forms of payment for a European customer but prepayment is insulting and legally impossible. Another common practice is the attempt to dump inferior merchandise at inflated prices. Europeans are not dumb; they read the same magazines, attend the same trade shows and get the same price lists and promotional mailings as you do. You may gouge them once, but never a second time.

Finally, I quote from a New York Times book review of "**Second to None**" by Robert C. Christopher: "... the main barrier these days to better-balanced trade is American incompetence, arrogance and shortsightedness."

WHERE DID ALL THE BUD'S GO?

During the recent House and Senate hearings on the satellite industry much was made of a practice espoused by both HBO/Cinemax and Showtime/The Movie Channel of rebating to a local cable company about \$5 per month per service for each TVRO owner who subscribed but chose to deal directly with the programmer (HBO or Showtime) rather than through his local cable company. These rebates were euphemistically called **BUD's** (Brand Utilization Discounts) by HBO and **MDA's** (Marketing Development Allowances) by Showtime but were commonly referred to, especially by Representative Tauzin and Senator Gore as "kickbacks". Although the practice was vigorously and almost paranoiacally defended by HBO Chairman Michael Fuchs as legal and common in other industries, when prodded by a letter from Representative Wirth both companies (HBO and Showtime) capitulated and discontinued the practice. Coincidentally, the capitulation occurred within a week of the Senate vote on the Gore Bill S 2823 and may have been responsible for swinging the five votes we needed to win in Congress.

Regardless of the timing and the results, the burning question is: **What happens to the \$5?** If the programmers could afford to give away a significant piece of their revenues to a cable company for doing nothing (remember that the programmers did all the work - decoder authorization, billing, collecting, mailing the monthly guides etc.) now that they are saving the money shouldn't they pass it on to the TVRO subscriber? And what about the vast majority of TVRO owners who live **outside** the clutches of cable companies and whose BUD or MDA ended up in the programmers' pockets - shouldn't the price to them be reduced?

"**No!**" says Stephan Schulte VP of Showtime who says that the money saved is being spent "**in other ways**". He explains that now that the cable companies

aren't incentivized to do marketing development among TVRO owners (**as if they ever did**), the programmers must do it and that justifies not lowering the retail rates. It seems to me that this is not a sound mathematical argument. If $\$5 + \$5 + \$5 = \15 **before**, now $\$5 + \$5 =$

$\$15$ doesn't add up. What are HBO and Showtime going to do to justify the missing \$5 that they weren't doing **before** the kickbacks disappeared? I think that Representative Tauzin, Senator Gore et al should delve into this curious mathematical problem in depth.

INDUSTRY AT LARGE

CORRESPONDENCE, NOTES, REBUTTALS AND CHARGES . . .

CST provides this industry 'forum' for the purpose of allowing members of the industry to comment on industry activities. CSD assumes no legal responsibility for statements made here and those providing such communications are held liable for their statements directly.

SOUTH Africa Report

Nice to see Coop back at CSD, and as I have a feeling that my subscription is nearly expired, mine is one of the cheques you will be able to benefit from soon. You will be pleased to know that I reversed my decision not to renew as a result of the meagre offerings of recent months, after reading the AUGUST issue. Your feature of NEW ZEALAND made interesting reading, and I look forward to the continuation of the series. Also the green pages look like a good idea. The following relevant information which you may or may not yet have is provided: SABC TV1 (plus some 5 FM local African language, English and other ethnic radio channels - not verified @ 60e western hemispheric tpd.1 - full transponder. Feed is B-MAC with national teletext data, and a source of compatible receivers apart from the model 2001 by PLESSEY AUSTRALIA (SCIENTIFIC ATLANTA) would be appreciated.

Private terminal ownership is still "illegal" within the borders of this country, and this type of publicity is kept at a **very** low profile by the fortunate few. However, business opportunities are becoming increasingly frequent in neighboring territories with careful exercise of publicity avoidance (politics!!). One exception appears to be the island of MAURITIUS whose engineer in charge of POST OFFICE TELECOMMUNICATIONS - radio section (+ FCC), appears to support an open skies policy in line with that of their former colonial masters, the UNITED KINGDOM.

The following equipment information which seems to have been totally avoided in the columns of CSD to date may save enthusiasts and system suppliers of "INTERNATIONAL CAPABILITY" installations a great deal of time, and is passed on without being a plug for the respective JAPANESE manufacturers.

HITACHI CMT2083 8 system 20" colour TV/monitor with IR remote.

HITACHI CMT2683 8 system 26" colour TV/monitor console with IR remote.

HITACHI VT39EM 10 system VHS front load video recorder with IR remote. (Replaces 9900EM 5 system VHS top load with IR remote).

NATIONAL NV780EM 7 system VHS front load video recorder with IR remote.

All of the above have been used very successfully over the last 2 year period, and proven to be ideal for the job. In case of

supply difficulties, they are readily available from "mail order" suppliers in HONG KONG. A suggestion that you may consider is the reintroduction of technical / constructional articles as featured in the early issues, with special emphasis on SCPC FM, circular polarization of feeds for antennas in the 16-20' class (bearing in mind windy & corrosive coastal conditions), horizon to horizon drives and other similar non US domsat requirements. Also of interest would be details of "gadgets" such as the transcoder you mentioned in the NZ article. Reception possibilities of the Ku-band fare of European programming south of the equator could be another worthwhile topic. (Published circuits with PCB layout preferred).

I hope you will find the above of some interest, and please withhold name & address from publication if you decide to use some of this material.

Someone in S. Africa

With B-MAC scrambling of the South African service, there is one additional 'reason' for those working on deciphering B-MAC to increase their activity level. The following letter provides even more impetus.

AUSTRALIAN Update

Welcome back! Great to see Coop on the front page again.

Here in Australia the satellite industry is moving very slowly on the domestic front particularly with the media moguls getting in first with the Club and Hotel scene. Holmes-a-Court, Bond (of America's Cup fame) and Powerplay are selling complete satellite derived packages of entertainment to a select group of **hotels** or clubs. For AUST (\$150 per week for 5 years, a club gets a complete 1.5m B-MAC Earth Station installed, maintained with a program of sport, variety and other, yet to be determined, programs (I have enclosed some literature to keep you informed).

This use of the satellites with our Government ABC service has left no capacity for Commercial Satellite TV till AUSSAT III is launched and hence the Industry is in the doldrums.

As discussed with you when you were in Sydney, B-MAC has had its problems as would be expected with any new technology but we are hoping that the lull in the market has given the sole manufacturer, Plessey, time to sort out their quality control. To date, about 3000 units have been installed in Australia and Papua New Guinea and Acesat has sold approximately

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66% of that total market. The quality of B-MAC is certainly unmatched by any other broadcast.

Most importantly the industry, manufacturers and distributors have organized an Industry group, known as - "SPACE" - (hope you don't mind) and yours truly has been elected Chairman(person). Our chief object is "survival" and if you have any good advice on that score, would love to hear from you.

The industry has numerous problems:-

- 1) Government policy or more precisely lack of consistent and persistent policy.
- 2) Lack of programming on the Satellite; only one Government TV channel and three Government radio.
- 3) Failure of the economy generally and particularly agriculturally. As the bulk of the market are farmers, world problems have bit the customer pocket not withstanding a complete 1.5m Earth Station sells as low as AUST \$2100.
- 4) Oversupply. Everyone was geared to selling **thousands** which has become **hundreds** and consequently there is the inevitable price wars.

Whilst the causes may be different I imagine our problems are similar to yours so would like to keep in close contact and get any help and guidance that might be relevant.

Mrs. Olga Sawtell
General Manager
ACESAT CORP.,
P.O. Box 428,
Caringbah N.S.W. 2229
(02) 526 2411

What a pity. The Australian 'plan', as we are currently detailing in our South Pacific overview series, was to provide at least one commercial 'super station' service to rural residents dependent upon Aussat satellite service; as a compliment to the single 'ABC' television channel now available. Now with the B-MAC secured special channels for movies and sports to hotels, the channel capacity available on Aussat is exhausted leaving rural TV viewers stuck with a single decryptable channel. This raises the question of busting B-MAC to a higher level. If B-MAC was busted and rural Australian (New Zealand, etc.) dish owners could then gain 'access' to these hotel feeds, the reason to own a dish would measurably improve. There are some groups inside the US starting to work on B-MAC and some groups in Australia doing the same thing. They may soon be joined by yet other groups, as the following letter suggests.

AFRTS/Please Don't Scramble!

I read with interest what Peter Sutro said about AFRTS in September CSD. We at Asia Pacific Satellite Systems have been installing TVRO's under the threat of AFRTS scrambling for the last 2 years. Last year while in Washington I met with Larry Pollack who gave us the stock answer about program suppliers being uptight about copyright and sales. We estimate there to be no more than a few hundred systems in the Pacific picking up AFRTS (5 meter plus type antenna). However AFRTS is officially beamed to military bases such as Clark AFB just outside Manila, where it is then retransmitted over UHF TV for the base. In Manila alone there must be several tens of thousands UHF antennas pointed at Clark. I know that in Seoul the American Forces Television Service (AFTS) transmits in the middle of the city and the same is true for many European cities. So AFRTS encrypts the feed, decodes it at downlink and AFRTS retransmits over local TV in the clear. Secure huh! This means programmers will still have their programs watched for free but penalized are the handful of TVRO's accessing AFRTS including not only many US expatriates but anyone who is interested in watching uncensored American TV. (Actually since big TVRO's are expensive usually owners are wealthy, influential, government high-up or policy making

types.) Do the Russians scramble their satellite TV? No. Is anyone interested in watching Russian TV? Normally not, although Russian video programs are improving a bit since Mr. Sutro's story. One actually gets a few good concerts and sports programs and some of the sitcoms look good if one could understand Russian.

The point is like it or not AFRTS is the best advertising America has out here. Next year Worldnet is supposed to start services to Asia (when they find the funding). Reports from Europe indicate that the programming, which is supposed to be US public relations orientated (propaganda?), is minimal and on the point of boring. AFRTS or for that matter CNN is doing an excellent job of promoting America, **USIA should just give their budget to Ted Turner** to get an Intelsat multi-country lease to cover the globe and sit back and watch the results! (Probably much more effective use, dollar for dollar, of taxpayers money.) Actually the whole question becomes entangled in Intelsat politics; we have approached CNN for decoding rights to AFRTS programs. They are open to this and no one out here could object to \$3-400 for a decoder and \$25 per year, but unless we pay an Intelsat downlink fee (around \$250,000 per country) and get local signatories permission (most countries have censorship), this is **no go**. It would be like HBO scrambling with no private decoders allowed period. So unless AFRTS continues unscrambled until Intelsat regulations are worked out or someone starts a worldwide network, which any international TVRO owner would **willingly** pay for, it is goodbye to the only USA global network **excluding anyone lucky enough to live within TV range of a U.S. military base.**

If the program suppliers were to provide more programs for a second channel as Mr. Sutro suggests, and IF they went onto Intelsat V hemi or zone beams putting 12 ft. dishes into the picture this would provide a new market for hundreds of thousands of TVRO's worldwide. Hence said program supplier could afford to buy a multi-country lease and profit by charging for services. The U.S. government is a good candidate to run this program under the auspices of the U.S.I.A., and it could probably even earn revenue for a change!

It is nice to have Coop back at the helm of CSD. Since I last briefly crossed tracks with him, I have been very busy out here. Working out of Hong Kong and Singapore APSS covers all of South East Asia (viz Indonesia, Thailand, Malaysia, Brunei, Philippines and China). We are distributors cum technical consultants cum turnkey installers cum everything. Actually since we started two years ago we are now experiencing a mini boom. APSS installs big TVRO's (usually Continental 7.3 or 9.1 meters) for diverse characters such as Royalty, heads of state, broadcast stations, oil companies and the like. We have an affiliate company in **Indonesia** where TVRO has really taken off since there is only one government owned TV station in a nation of 160 million. We currently sell about **200 systems a month**, about 50% 6/8 feet to access Palapa (Malaysia and Thai programs) and 50% 12 feet for Intelsat reception of China (2 video programs), with a smattering of 16 feet for AFRTS and the occasional 25 foot for bigwigs. AFRTS is slightly below threshold on 16 ft dishes (elevation below 10°) but with good electronics (we use ICM receivers that we modify in our Singapore shop) sparkle rate is minimal and 16 foot is an acceptable size home dish and relatively cheap (well under \$10,000 installed). Actually our 12 foot's are the big business and we are developing a market over South East Asia since there are expat Chinese all over and the China programs are relatively decent, free of propaganda, lots of education, (lessons in English, Japanese, Physics etc) and some good entertainment. China's hemi-beam lease hits us with EIRP of around 28-29 dBw. We use our own design receiver, custom made for us, with built in Intelsat IF and SCPC audio circuit (for Thai audio), although China is supposed to go to B-MAC soon according to S/A (this disease is catching!). We have a complete distribution system with warehouse, service centre, trained installers, import licenses, and a dealer network. Complete 12 ft system installed with SCPC receiver, motor drive and 65° LNB costs

around 3500 USD (not bad considering import duty of 200%). Our major problem is the flood of **cheap Taiwanese equipment** now being dumped onto our fledgeling market! Since TVRO is a hot item, every trading company wants to sell or import TVRO without knowing what they are doing and this puts pressure on our price structure.

We also looking into repping some major U.S. commercial outfits (RSI, Vertex, Standard Communications, LNR) for our commercial broadcast customers since the trend out here now is to get away from Telecom (Signatories) feeds and have your own earth station.

APSS is gearing up for what we see as the future: SMATV networks throughout S.E. Asia since cable is too expensive except for cities like Hong Kong and Tokyo. More programming would of course help all this enormously. We, of course, are trying to help would be programmers to get on to Palapa or Intelsat through our contacts locally.

Enclosed picture for your interest is our installation for **Yang di Pertuan Agung** (King) of Malaysia. 9.1 meter Continental, shown here on Intelsat V-F8 (AFRTS). Of interest is the non-cable link. Since his Majesty did not want any trees cut down close to his palace, the antenna was located almost one kilometer away. We are using a one watt amplifier on the 950/1450 IF and two log-periodic antennas. Fortunately the King 'instructed' the local FCC and there was little problem about the 500 MHz of bandwidth (lucky we are pointing away from the neighboring state of Singapore which the palace overlooks). The remote control was a major problem since we were using dual motor drives (horizon to horizon arc drive and declination adjustment actuator). Houston Tracker worked with us closely and we used a hybrid Tracker V/Tracker II combo to control **both motors** via the five's UHF remote with directional antenna! Works quite well, considering the 5° elevation of Intelsat. His Majesty's favorite program? **AFRTS**.

Currently we are working on a 7.3m for the Sultan of Brunei (you might have heard about him as he is supposed to be the

richest man in the world although that's between him and his bankers.) Sorry to have missed Coop on his trip out here; you should really have popped in while in Singapore or Hong Kong.

By the way would you be interested in articles about TVRO out here? If I can ever find the time as we are **very** busy nowadays with too few staff and too many projects. I was **supposed** to write for **Satellite World**; they were hot to trot but somehow they forgot me, don't even send me their magazine anymore (for gratis). Also pen the occasional article for **Asia Broadcast Magazine** (who changed hands) but most times I am busy writing proposals or tenders or feasibility studies or something.

Read your N.Z. travelogue with great interest. We have been approached by a big N.Z. company for consultation in TVRO matters. I also have a personal interest since my parents moved to New Zealand from Africa and my brother-in-law is one of the chief engineers for N.Z.T.V.'s translator service. Beautiful country isn't it?

Tim Brewer
Asia Pacific Satellite Systems, Ltd.
7 Ice House St, 4F
Hong Kong
(5) 225452/(5) 236949

Tim Brewer joined the pilgrimage to Sri Lanka with us to visit Arthur C. Clarke in 1983. He is now very successful as this letter indicates but his firm faces serious problems with the loss of the AFRTS feeds if their scrambling goes ahead, and they adopt a scrambling format not readily 'busted. Tim's note that the Chinese channels on their new Intelsat leased channels are planning to scramble, with B-MAC should strike at the heart of many Chinese (Taiwanese) engineers. S/A may be opening a Pandora's box here by spreading their B-MAC system so widely and dangling a bust-us-if-you-can carrot in front of so many talented engineers. Today Videocipher; tomorrow B-MAC.

TRANSPONDER WATCH

RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P.O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

KENTUCKY designated October 11th as 'Earth Station Awareness Day' throughout state with official proclamation by Governor Martha Collins.

USIA has installed Molniya tracking dish system to keep an eye on the Russian television services from their inclined orbit path to the north. The system was installed by Satellite Systems Corporation of Virginia Beach, Va. SSC is also involved in the development of the USIA 'Worldnet' service into American posts in Asia and the South Pacific as Worldnet expands into the Pacific Ocean region.

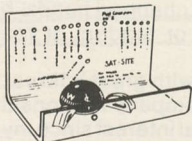
GI's Videocipher division reports they have recently counted the 50,000th VC2000 unit to be authorized for home dish service. GI has taken over the distribution of the VC2000 from M/A-Com.

SATELLITE Earth Stations is now offering 3 year consumer financing pass-through for its dealers to be able to offer home system financing to customers. SES is holding seminars in Austin (December 02), Mamou (December 04), Covington (December 05), Orlando (December 08), Macon (December 10) and Nashville (December 12). Information from 318/468-2203 (Reggie Soileau).

R.L. Drake is providing dish dealers with advertising and marketing support kits including ad slicks, line art and window stickers.

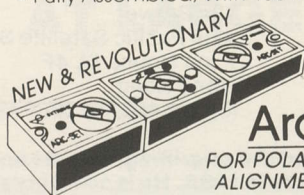
WGN began testing of scrambling system using Videocipher last week in October. Tests initially ran about 5 minutes each and did not disturb operation of many sub-carriers on transponder, much to surprise of many. Plans are to test for two

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weeks, or approximately CSD release date, then go on with non-addressable open key test on full-time basis, upgrading to fully addressable service four to six weeks later.

M/A-Com Videocipher program was developed with numerous

outside consultants participating in various portions of program. This has lead to disagreements between former consultants and M/A-Com about payment of 'hush money royalties' that was to be paid by M/A-Com to those who helped with project. With sale of Videocipher to GI, payment plans have stopped causing several participants to 'open up' with their knowledge to individuals and groups who are working to bust Videocipher. M/A-Com may be sorry they placed themselves in this position with former consultants on Videocipher project.

SPACE has lowered cost of dealer certification program from \$770 to \$595; included is 7 prepared tests, videotape trainers, and certification of dealer at end of completion of course.

NOVEMBER issue of *Orbit*, featuring front cover promoted 'exclusive interview' with Captain Midnight was disappointment; John MacDougall revealed nothing controversial or intimate about his method of taking over HBO in interview and story was backed up by publisher editorial that condemned attack even as publication was featuring report on same.

CAMPUS Satellite Network has kicked off first of five nationwide programs for this school year with feeds from Europe and USA. Dealers interested in bringing package to local college or university campuses should call 202/887-1717.

GEORGIA electric cooperatives on appeal to state Supreme Court have been handed reversal of lower court decision that would have prevented co-ops from being in TVRO hardware (software) business. Suit was originally brought against 'EMCs' by trio of Georgia dealers who contended that low interest, government backed funding available to EMCs should not be used to allow them to be in business against independent dish dealers. TVRO dealers, in losing appeal, will seek reconsideration.

SCIENTIFIC-Atlanta, up and down in recent quarters with earnings and losses, is up again in most recent quarter. Firm had been considering dropping out of TVRO field after recent disappointing quarter. Latest reports have firm earning \$3.8M on sales of \$106.7M. Even home dish sales were reported 'profitable'.

S/A B-MAC encryption is rapidly becoming 'defacto standard' for private video networks, just as Oak Orion was originally when the video scrambling began. Latest customers include Mayo Clinic for Arizona/Florida/Minnesota network, Federal Express, Merrill Lynch, JC Penny and Digital Equipment Company, in addition to Holiday Inn.

CBS NEWS, originally scheduled to send to France daily 'CBS Evening News' via satellite, has dropped plans. Program would have been added to 'Canal Plus' subscription package now being put together. Transponder time had been leased; will now be dropped. CBS blames French for roadblocks and shutting down project before it started.

COOP/ Continued from page 5

attack on your abilities; but how many of you claim to be software scientists or LSI chip designers? Not many.

I have a special file which I never carry with me, containing the names and telephone numbers of all of the key people working on breaking scrambling (no, it is not kept in our Florida office either so you can forget about breaking in there to look for it!). When I get fed a story about EPROM bytes or Videocipher unit addresses or decapping U7 to blow up its internal circuits, I pick up the telephone and call up the best person I know in that field. Not being either a computer scientist nor an LSI designer, it is easy to fool me if you use big words and talk in coherent English. It is not so easy to fool the people who have made themselves and their expertise available to me.

An example. There is a routine 'possible' with the front panel keyboard on Videocipher which **allegedly** will allow you to key in certain commands and unlock any Videocipher encoded transmission, briefly. I thought about publishing that routine since it would be a nice opportunity to 'warn' M/A-Com that some people were making good progress in understanding the inner workings of the VC2000. But the various people who claimed that there was such a routine were reluctant to share it with me. I finally decided that either the routine did not exist (another of the fairy stories) or if it did exist, the people I was asking about it didn't know it either. I finally took the problem to one of my 'experts' and got a solid answer which I was later able to verify using a VC2000. No, I don't really see any sound reason to publish the results at this time.

Much of what we publish, especially in **SCRAMBLE-FAX**, is of dual purpose. First, it is intended to help people better understand the capabilities, and limits of the

various scrambling systems. The recent (September) issue, for example, tells you how to **disable the on-screen graphics routine** in the VC2000 so that after you do initial set up of the unit nobody can instruct the unit from an uplink to print text on the screen. We detailed this since there are people out there who feel HBO might be violating their 'privacy' by transmitting special announcements and the like without their permission. The same September issue details our test reports on the Oak Orion chip by Westar (see October report also in CSD). We also list sources for Westar chips and Oak Orion P units. However, some of what we print in SCRAMBLE-FAX is designed as 'inside messages' to people at LinkAbit. There is a growing concern as more and more independent efforts get close to solving Videocipher totally that 'the hand of TVRO **not** be tipped' so that LinkAbit (M/A-Com) knows what is coming before it gets there. So stuck into SCRAMBLE-FAX and on the Hotline are some deliberate 'false trails' to keep the 'other side' guessing what is really happening. They of course have figured this out on their own; what they do not know and will not know is **'which trail is false?'** Let them ponder that. The more \$100,000-per-year LinkAbit people we keep tied up debating our collective progress the better off we all are since this is totally nonproductive time for them.

Sometimes I get calls or letters from people who are bright enough in the collective functions of Videocipher or U7 or the software to have spotted a 'false trail'. "Is Desug really trying THAT???" they ask. Not always sure who is calling. I assure the caller that 'yes indeed, they are'. I figure I am getting a couple of calls per month from plants from LinkAbit and so I have to be defensive with my information when I get these calls out of the blue.

So having admitted that, where are we; **really???**

There is excellent progress on several fronts. One group spent \$6,000 to have U7 decapped (the top lifted off) and another \$20,000 to have the internal circuits recreated from an electron microscope enlargement. Another group has significant data out of U7 and the supporting chips. I am in awe with the software scientists who are working on this; people who appreciate that behind Videocipher is a computer and computers only do what they are told to do, when they are told to do certain functions. One of the early problems (now solved) was to get a certain chip off the board into a test jig. The chip was supported by a battery and when it came out of the board the battery was disconnected. That causes the chip to lose all functions. The trick was to get the chip off the board and not allow it to lose battery power (and therefore its functions) in the process.

Once off the board and into a test jig, then software scientists could begin playing with the chip making small, incremental changes in its operations by connecting it to an external computer and then observing the effects.

I suspect none of this interests the dealer who merely wants to know when he will begin selling enough product to sustain himself and his family once again. I cannot say soon; nor can I say 'a long time'. It will happen when it happens. I can tell you that given the present plan to use the 'broken Videocipher' as a bargaining chip at the negotiating table, the length of time required is shorter since once the system is

broken and repeatedly capable of being broken again and again (some have had short term results already), **we will go directly to the negotiating table.** There is no point in waiting around for someone to create a 'BlackCipher' box since that is not part of our negotiation plan at this time.

VIDEOCIPHER Busting Philosophy

It may surprise you to learn that some of those people busting Videocipher **worry** that they are doing the 'right thing'. Most are concerned that some little understood federal law will snare them in a trap and whisk them away to a federal pen for 5 to 10 years. And that is understandable. A few, however, have a conscience about all of this and ponder how the cable TV industry (programmers and cable distributors alike) will 'fare' if there is widespread dissemination of Videocipher busting information, or product(s).

Most of the early successful busters have been people with special talents in computer programming or logic circuitry. Very few, if indeed any of the first-round-busters are business people. As a group, they have been engineers with talents and most probably have some difficulty balancing their own check books.

Several of the early busters quit **after proving** they could do it. There is a 'high' that goes with successfully unraveling Videocipher. Many of these people cite their perception of M/A-Com's arrogance in releasing and promoting Videocipher as their incentive initially. Many people simply do not like to be told 'You **cannot** do that!' Well, **they did.**

Following on the heels of the early busters have come the **business** engineers; people who have successfully made the transition from an engineering position to running a business. Here we see people who understand marketing, care enough about the law not to invite being nabbed and hauled off to the pokey, and who are concerned more about the 'security' of their own systems, and their 'probable market share' than anything else.

Some dialogue follows.

"It is a mistake to market this patch system before March or April of 1987" contends one businessman-engineer who heads up a group that has successfully busted Videocipher. **"We need to have Disney scrambled, we need to have as many other services irrevocably committed to scrambling as possible before we begin to offer our 'service'."**

The logic here is that nobody but M/A-Com knows truly the number of Videocipher units in the field. HBO, Showtime and others routinely release 'home dish subscriber numbers' **but nobody believes those numbers.** With Congress breathing hard down the necks of the cable industries, it serves the interests of cable to **inflate** the actual number of descramblers in homes. We all know that cable lies when they appear before Congress; why should they tell the truth in their press releases?

"Cable has to be so committed to the Videocipher system before it is discovered the system has been breached that there is no 'easy way' for cable to bail out of Videocipher and move on to, say, S/A B-Mac. Premature release of one or more descrambler systems will only increase the chances that cable could

jump systems in midstream."

People who have tamed the Videocipher beast are already working on B-Mac. Scientific Atlanta will enjoy reading that. Videocipher, to date has primarily been a US and Canadian effort. B-Mac, now in use in Africa, North America and Australia and likely to be in use in Europe shortly is already an international effort. Several Australian groups are in regular communication with a couple of US groups. B-Mac looks like a tougher nut to crack than Videocipher but then Videocipher looked pretty difficult in the beginning.

There is a 'defensive business position' about breaking B-Mac before it becomes any sort of 'standard' for cable. Another quote:

"If the users of Videocipher decide the system is no longer secure, some will be tempted to upgrade to the 'next level'. I think we must let them know that any system thrown up there which is not marketed at fair and reasonable pricing to the home dish industry is going to be broken. This is not a battle with M/A-Com or HBO; it is a battle between the rights of rural Americans (et al) and the programming consortium."

The logic behind much of this is that by pricing the hardware (descramblers) and the software (programming) 'out of line' and 'out of reach', and by penalizing rural citizens with price fixing that deprives them of needed entertainment, information and education, ... the programming 'consortium' has laid down a gauntlet. Their long term interests are best served by putting the present dish industry 'out of business'. The marketplace has not worked despite lofty pronouncements to the contrary, few really expect it to work. Congress, some minority members of this body, tried to enact legislation which would have resolved at least some of the difficulties. This also failed. What remains is a technological answer to a technological problem.

Another quotation:

"I believe we can force an adjustment in the marketplace. First, the programming consortium should be told that the 'holes' in Videocipher can be fixed. We could teach M/A-Com how to reconfigure the software to fill in the holes. That is a pure business deal; we would consult with them and provide them the information they need to resecure the system. Of course we would expect to be paid for this consulting work. Then we could help them assure that no additional holes are found, and put into the marketplace. But... at the same time we want a more rational selling price and distribution plan for both the software and the hardware."

M/A-Com, to date, has not responded. They have taken the public posture that Videocipher has not, and cannot be broken. If they really believe this at the top corporate levels, the company is being run by fools. As the November issue of **Scramble Fax** outlines in building block form, there are no fewer than four and perhaps as many as six totally different ways to break into Videocipher. Those who watch **Boresight** on Thursday evenings will have seen this writer demonstrate at least one of these techniques during the month of November.

M/A-Com and the programmers have a very narrow time window here to act or react. It may even be shorter than the time between when this is being written and you see it

in print. M/A-Com clearly has the opportunity to hire some outside consultants and 'arrest' the spread of the Videocipher busting technology. But there is an impatience on the part of some who have broken Videocipher to begin marketing their creations. Outside-of-USA corporations have been formed, distribution alliances are being explored and component parts are on order to build circuit boards. **A clock is running.**

At least one Videocipher buster claims to have a bigger security problem than M/A-Com. Another quotation:

"My Star Wars technology background convinced me there had to be a 'back-door' into Videocipher; some way to bust the system without getting involved in the digital data stream. I found it."

If he did, M/A-Com may have a much bigger problem than merely hiring some outside consultants to show them where their software has holes. His technique claims to ignore the software entirely. Others have made similar claims but not with the credentials of this particular individual. He continues.

"The total cost is under \$10 and all of the parts are available off the shelf; perhaps even at a well equipped Radio Shack. The simplicity of this technique is such that any TV repair shop that got its hands on one of my add-on boards (six wires interconnect to the VC2000) would have duplicate circuit boards in a matter of hours. Breaking into the back door was not difficult. Closing the door now that I am in, so others cannot come in the same way is very difficult!"

M/A-Com, meanwhile, continues to ignore the warnings and brushes off attempted contacts between Videocipher busters and the corporation itself. How do we get these two sides together?

Taking a cue from the recent Iceland meeting between the two super powers, I have toyed with the concept of holding a 'Videocipher Busting Summit'. At a convenient offshore location. My concept is that representatives of all of the now scrambled and would-be scrambled programmers plus M/A-Com, S/A, GI would be invited. Those who chose not to attend would do so at considerable risk. They would sit at one end of the table. At the other end would be the representatives of the Videocipher Busting groups. In the middle would be the live, operational technology which the circuit busters have created.

There agenda would call for demonstrations of each system or technique and then a discussion, open and frank, about the 'risk' each system presents to the cable programming consortium. As M/A-Com would learn at such a 'Summit', there are changes which could be implemented into the software of Videocipher **tomorrow** which would correct the 'software holes' located to date. That would leave all of the VC2000s already in the field 'vulnerable' to software adaptation but insure that all future units would be incapable of software alteration. M/A-Com might, at programmer insistence, have to recall ALL of the existing VC2000 units for software modification. They could pull this off by simply threatening to turn off, permanently, all units not turned in for correction. That would curtail or stop the **software** specialists who have located holes in the VC2000 program. That would not stop the **hardware** specialists who have created 'back-door' and other techniques for busting Videocipher without regard to its software direction.

The fact that M/A-Com, with some outside counsel

could fix at least some of the present 'holes' in the system is important. By ignoring the opportunity they now have to do so will send a 'message' to anyone who believes he has or can break the system. It will mean M/A-Com really knows they have a vulnerable system and it will signal all sides that M/A-Com is not ready to stand behind the product in the marketplace; both on and offshore.

The next sixty days will be crucial to the Videocipher program.

TRIP Two

In our feature section this month we continue with a look at the young, troubled TVRO 'industry' in the South Pacific. Patti and I traveled there during May and June collecting facts, figures, videotape, photos and memories which will stay with us forever. A few of the memories follow.

Australian people are quite different from New Zealander 'Kiwis'. One generally thinks of both countries as being populated by immigrants from the UK and while this was true 50 or 100 years ago, there are distinct differences today. Australia has, since World War Two, opened its doors to virtually all of Europe and subsequently to southeast Asia. Australia's culture is not unlike American culture of perhaps 50 to 75 years ago; wave after wave of immigrants from first one country and then another has swept ashore. Those who can count back 4 or 5 generations as 'Australian' are more than a little concerned, and quite protective, of the Australia they grew up in where their great grandparents settled.

New Zealand has been less overrun by the immigrants and while there are plenty of non-UK Europeans living there, their presence is not so obvious. One finds whole sections of Melbourne or Sydney where only Greeks or Germans live, for example; not unlike sections of New York at the turn of the century. This 'ethnic flavoring' is having a considerable impact on Australia and finding productive jobs for everyone entering the country is a problem. Moreover, some of the 'older residents' are not happy with the changes. Allowing several hundred thousand new people from a single country, such as Viet-Nam, into Australia has a far bigger impact there than it does in the USA, simply because of the much smaller population base to begin with. New Zealand, with just over 3,000,000 people, is even more precariously balanced between those who were born there and those who would enter as immigrants.

There is a 'frontier flavor' outside of the cities in Australia, reminiscent of Alaska during the recent oil-rush or sections of Colorado today. Rural New Zealand, on the other hand, is pretty much like the cities in New Zealand and we found the people in both about the same. Patti and I liked Cairns (pronounced 'Canes'), in the northern portion of Queensland, the best of all of our stops in Australia. Cairns now has direct air service from Hawaii and some points in Asia and that is no simple 'trick' for a city of perhaps 50,000 tops. Cairns is similar to Key West in the state of Florida; a 'wild-west' attitude built in the tropics. People dress (or undress) there as if they were on always the beach and the shops and stores are very informal although surprisingly well



AFTER 200 miles of no homes, towns or people you are suddenly presented with a train repair crew working on the tracks. Groups such as these work in extreme isolation for months at a time, cut off from humanity except for the daily passing of a train.

stocked with pricing that is exceptionally fair for Australia. There are no real tourist bargains anywhere in Australia; electronics, cameras, watches and the like all are imported and the Australian import duties are very high. Clothing manufactured in Australia is very reasonably priced but apparently shunned by many natives who want designer labels from Paris and New York. Patti found one beach-side shop in Cairns that specialized in tropical clothing (light weight, bright colors, intended for a warm climate) where she spent a couple of hundred dollars for nearly a dozen outfits which would have cost well over \$500 in the states. Since we live on an island, it was an excellent opportunity to load up on clothing which would be worn 'at home' for less than half what it would cost in Miami or Provo. Alas, such shops were rare and you had to really comparison shop with a vengeance to locate such bargains.

We flew into Australia from Singapore on **Quantas Airlines**. Quantas runs an airline like people should run an airline; they actually deliver what they promised in TV and print commercials! We travel economy of course and expect or hope for nothing more than a comfortable seat and a small snack, if appropriate. Quantas gave us free movies, two huge meals during an 8 hour flight, kept a constant flow of wines, champagne and snacks moving up and down the aisle ways and the attendants (male and female) were bright, alert, courteous, concerned and extremely helpful. They were even entertaining, doing an animated burlesque routine during the mandatory instructions for use of the life jackets and escaping from the airplane in the event of an at-sea ditching. We must rate Quantas as the best airline we have traveled on, and ultimately we would be on four separate Quantas flights before arriving back in Los Angeles.

Landing in Brisbane, mid way up (or down) the eastern coast line, on a Saturday morning we caught the **Queenslander** train out of Brisbane on a Sunday morning. We like train travel, and the Queenslander goes from Brisbane to Cairns (around 1050 miles) in 35 hours or so. The train has a private compartment with

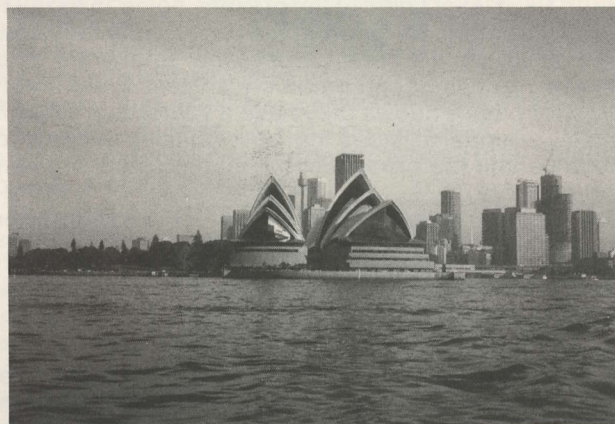
double bunks, a fold-down sink and plenty of room. We had five meals on board during the journey and the whole thing cost us \$100 US. Flying from Brisbane to Cairns was considerably more than \$100 and we would have missed the opportunity to see Australia 'turn' from the semi-tropics (Brisbane would be similar to Charleston, SC) into the full tropics around Cairns. If you are not in a hurry, it is a delightful way to travel; sugar cane fields, cattle, and small towns with heavy rain forests and lovely hills and mountains on the northern end. As we approached Cairns we discovered 'ant hills'; huge, often 10 feet high, mounds of dirt and compost laboriously piled into castles on the ground by some very industrious ants. Thousands and thousands of these ant hills per acre (or hectare) of land. This is the stuff Alfred Hitchcock once used as inspiration for his movies.

Keith Anderson, the founder of Anderson Scientific, wanted to by a nice 'ranch' near Cairns. He was the first to point out Cairns to us, on a map, and insist we stop there. We were grateful he did after arriving. Cairns itself has no real beaches but just a few miles north there are hundreds of miles of unspoiled beaches. They call them 'white sand' and I suppose on a scale of 1 to 10 with 1 black and 10 pure white, they were at least a '6'. Our home island, Provo, is however the only **'10 beach'** we have ever seen and we've visited hundreds if not thousands of beaches in our lifetimes. We rented a car in Cairns and drove north another 100 miles and then went inland to the tableland that sits off the coast. The table land is perhaps 2,000 feet higher than the coast and the world changes as you drive up, out of the 'rain forests' and onto the table. From very moist and tropical, it becomes quite arid in a hurry. And we were back into the giant ant hills.

In between the coast and the table lands, you have some of the most breath taking scenery and vegetation in the world. We devoted one day to riding a small, narrow gauge railroad that plies between Cairns and the first town reached at the top of the table. The train crawls along the man created ledge that winds back and forth, switchback style, up the side of the mountain range. The tracks are usually about 2 or 3 feet 'setback' from the edge of the cliffs so you have the eerie feeling that the train is 'floating' in midair along the side of the mountain. Between Cairns and the top you pass through 15 tunnels hacked and blasted out of solid rock. We shot some of the best video I've ever had the opportunity to shoot on this 90 minute train ride; the train company has done a remarkable feat by building this facility.

Off the coast of Cairns some 15 miles or so is a coral island. The island, **Green Island**, is along the banks of the Great Barrier Reef so you are straddling the South Pacific and the reef-protected coastline waterway when you visit there. We stayed overnight at the only hotel on the island and wandered the beaches for hours collecting sea shells which were totally foreign to us. Patti placed the ten pounds or so of shells into the sink in our cabin-room and filled the sink with water to clean the shells before packing them away for the long trip home.

"Come quickly, some of 'the shells' are trying to climb out of the sink!" she yelled at me. Sure enough,

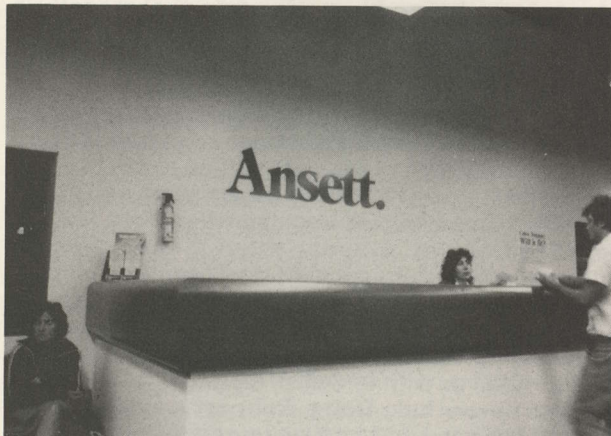


AUSTRALIA is a study in contrasts. From extremely sophisticated Sydney city life, including world famous opera house, to rural homesteads as much as 300 miles from nearest neighbor, there is no 'one Australia'.

inside many of the shells were tiny or not so tiny creatures which found the warm, fresh water uncomfortable; they were hoofing it out of the sink as fast as their tiny legs would carry them. We tried freezing them out of the shells with ice water. When that failed we went to the other extreme and tried to boil them out. No luck; the creatures were determined to stay inside the shells no matter what. We took their pictures and set them back on the beach. Boy, will they have a strange story to tell their children!

From Cairns we flew south to Melbourne. Within Australia, you fly on one of two domestic, national airlines. Our experience here was less satisfactory than Qantas. After very carefully apportioning our luggage between 'check in' and 'hand carry' back in the states when the junket started, we had the art of getting ourselves and our growing luggage on board any airline down to a finely honed process. Not with the Australian domestic airline. **"You have one too many hand carry items"** I was told. I set them all down and we counted them, together. I was helping Patti and had one of the small (camera) bags she usually carried. I handed her the bag and responded **"Now I have the correct number"**. The airline clerk glanced at Patti. **"Now, she has one too many"**. I suggested she check me through and then Patti could hand me a bag and she could check Patti through. The airline person found no humor in my suggestion. Ultimately, Patti's purse (admittedly, not a small purse but a purse none the less) was 'the problem'. By now the line behind us was growling and rumbling. We were tying up traffic and the girl was **not** going to let us on the airplane until we surrendered a hand carry bag. Never mind that by weight or volume we were well within limits; we had numerically **one too many**. One last desperate try as the crowd behind us began pushing at us; I tried stuffing a small one into a bigger one. The zipper stuck (Murphy's Law) so to keep from being trampled by the surly crowd I gave up my portable Brother typewriter. I knew we would never see it again as a carelessly scrawled baggage tag was affixed to it.

The Cairns to Melbourne flight did not go to Melbourne. Nasty weather in Melbourne forced the plane



ANSETT/ avoid if possible.

to land in Sydney. Six hours later than our scheduled arrival, we finally ferried to Melbourne from Sydney. Being the pessimist that I am, there was virtually no chance the tiny typewriter would shuffle around in the Sydney airport and actually arrive in Melbourne with us. Wonder of wonders, at the very end of the baggage here it came, straps broken, case torn, and only shreds of a baggage tag remaining. I carefully picked up the rumpled case and held it in my hands. Inside it rattled; not a good sign.

Melbourne was a 'culture' stop. Sydney, as we would later see, is 'the cultural center' of Australia. Tourists apparently skip Melbourne routinely. "You are actually coming to Melbourne as tourists??" wondered the businessman waiting for his own luggage. "Why would you do that? Nobody ever comes here as tourists!" That didn't sound very encouraging to us. We asked him what we should see while there. After thinking for several minutes, he finally suggested a museum (we abhor museums) and then in a spurt of recollection said "Oh yes, be sure to ride the trams". The 'trams' are roughly akin to the cable cars in San Francisco. And they would turn out to be our primary mode of transportation while in Melbourne.

We liked Melbourne; Patti liked the hotel there best of all the hotels we stayed at during our trip. The Park Royal was new, very European, the food was exceptional and with the special discount tickets we had for hotels, very reasonable. The trams stopped at the corner and on the trams one can cover the entire city. Melbourne has excellent restaurants (we were there too short a time to be more definitive than that) and with the wide range of European and southeast Asia immigrants, there is food to match any taste (plus probably several tastes you have never experienced in your life).

We flew from Melbourne to Christchurch, New Zealand (on Qantas of course) and then nine days later returned to Australia from Auckland, New Zealand; again on Qantas. Sydney is supposedly 'the city you don't want to miss'. We found it overrated. Yes, their national 'Opera House' is interesting and so are their waterways and bays and rides on their tour boats.

Sydney was the only place in Australia where we encountered genuinely surly shop keepers, however, and we found several. Neither Patti nor I tend to bring out the ugly side in people so when they are nasty to us, I figure they are just plain nasty. We did find a few interesting shops there, however, and again were able to locate Australian made clothing at US-comparable bargain pricing. But that is a long ways to go to buy some shirts and skirts.

There is far more to Australia than we saw. We stuck to the eastern edge of the country and were repeatedly told about places we should visit in the west and center of the country. When (not if) we return, it will however be to the 'gold coast' region surrounding Brisbane and to the north around Cairns. Australia has a very diverse cultural foundation, especially now that so many recent immigrants have been allowed in from all over the world. The 'state' cares for those who are sick, illiterate, and poor as few national economies do and that is one of the reasons why they are so 'protective' about whom they allow there and for how long. To get into Australia you need a 'Visa' which limits the length of your stay, what you do while there, on the application for which you 'swear' you will not ask for free medical or other government assistance while you are there. With the exception of some shop keepers in Sydney and some employees of an airline, we found Australians to be extremely interesting, friendly, and anxious to share their country with you. But, as we will see properly this month in our feature section here in **CSD**, it holds little immediate promise for entrepreneurs interested in selling or distributing TVRO hardware.

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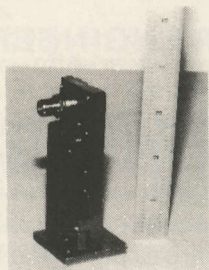
WITH The Troops

Worldwide, there is a veritable 'army' of TVRO enthusiasts pioneering 'home dish reception' in far away places seldom studied by standard school texts. Through the years we have reported to you here in CSD of the activities of these pioneers, and I am sure these reports have led to still additional pioneering by others. Many of the original pioneers such as **Bob Behar** of Hero Communications have gone 'underground' in recent years, aware that sometimes publicity for their work has backfired and they have been precluded from certain areas of the globe with their portable antenna 'kits' because word of their impact has preceded their arrival.

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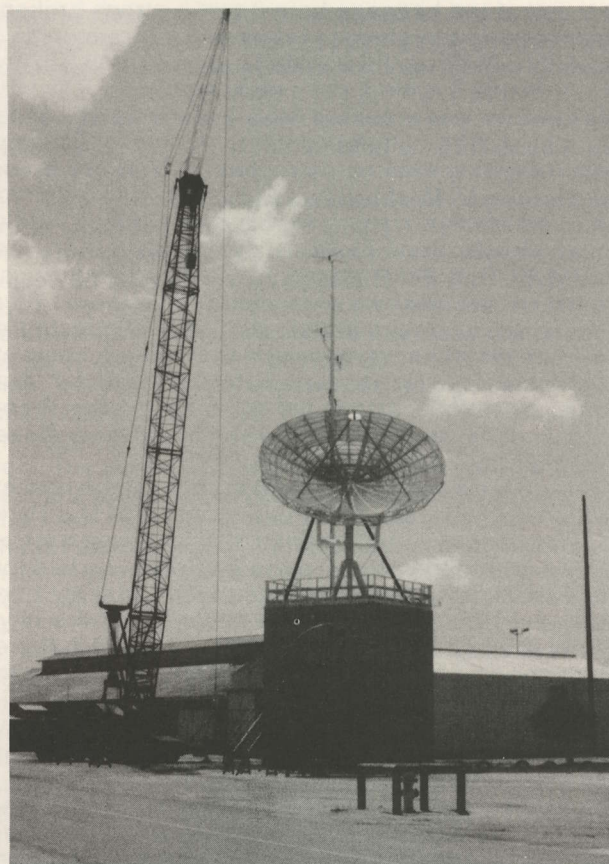
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(Speaking of Behar, he currently carries around an eye opening set of grubby color prints shot recently in Beirut. You remember Lebanon, right? It seems an enterprising TV station operator in Beirut had to have a big dish installed, quickly and price was no object. Behar really had to pay through the nose to sweet talk an engineer into spending what was scheduled to be a week in Beirut to install the dish. Suffice to say the dish was installed one day **and then blown up the next day** when a rival broadcaster decided he did not like his competition having a direct satellite feed! Behar's photos show the dish installed, and then de-installed all in a few hours time. The de-installation displays fragments of a large Hero dish scattered over ten acres with the ever present Lebanese militia standing guard over the remains, with tanks!)

In a less heroic trek, **Doug Dehnert's** USS/Maspro team recently returned from an unnamed island in the Pacific. Oh what the hell, I'll name the island; **Johnston Atoll**. Old timer readers of CSD may recall a front cover photo with Dehnert and I standing in front of an 11 meter antenna on Johnston back in 1984. We had on US military issue 'gas masks' in the photo if that jogs your memory. When Doug and I traveled to Johnston in '84, we installed a 3 channel over the air rebroadcasting system that relayed from the dish to the barracks and officer quarters three satellite fed channels.

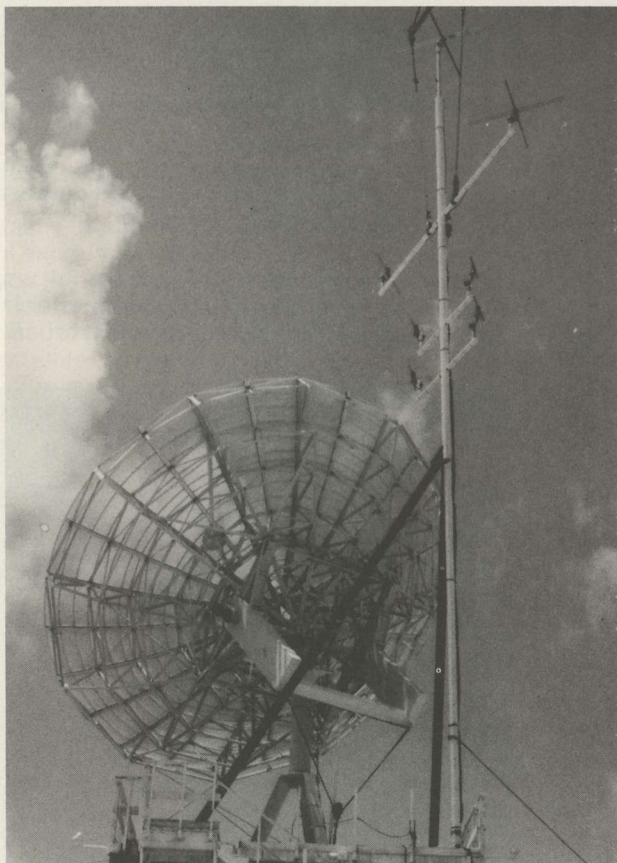


USS FIVE METER (front) and 'military surplus 11 meter' atop concrete building to rear. Five meter is anchored on Telstar 301 for ABC and CBS feeds while the big dish plays on Galaxy 1.

Recently the USS crew, less Dehnert or this tag-along person, went back to enlarge the installation. This time USS had put together a 7 channel system, transmitting with ten watts of power on VHF channels 2, 4, 6, 7, 9, 11 and 13. The single 11 meter antenna which the military folks commissioned 'through channels' from some old missile tracking application was still working and to that the USS crew added a five meter dish of their own manufacture. Now the 3,000 or so people who will be living on Johnston as a part of the expanded US military test activities in the Pacific (you read THAT here first) will be able to lay in their barracks and tune in on their rabbit ears ABC, CBS, ESPN, WTBS, CNN and two **not identified** premium services.

The two network signals come off of Telstar 301. And they are received on Johnston on the USS five meter dish. Johnston is south and west of Hawaii by a quaint two hour ride on an 'Air-Mic' plane that closes off half of the body-interior for cargo and leaves less-than first class seating in the other half.

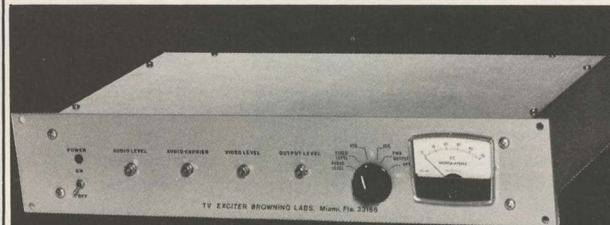
The other five signals come off of Galaxy 1 through the 11 meter 'surplus dish' the Air Force types brought to Johnston. From the original installation back in 1984, there are still a pair of Avcom 3 receivers in the racks for the two network feed signals and then the balance of the channels have been processed with USS/Maspro commercial series receivers.



TRANSMITTING antenna tower behind 11 meter dish is 96 feet high and supports Scala brand transmitting antennas (crossed dipoles) for seven channels of television.

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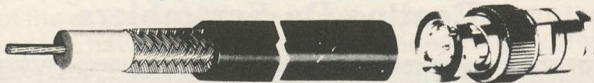
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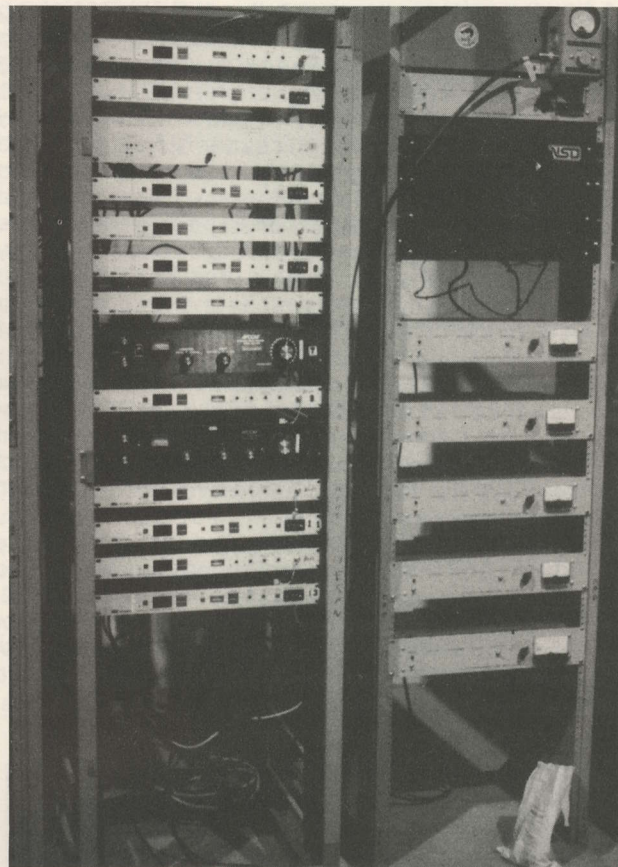
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TV JOHNSTON: USS/Maspro demodulators and modulators plus AVCOM and Browning Labs equipment provides television on seven channels to this US outpost located far to the south and west of Hawaii.

When Doug and I were on Johnston in May of '84, we patched together CATV grade modulators for channels 2, 4 and 6 and fed their outputs to a custom built broad-



HAPPIEST COMMAND in the Pacific; Lt. Colonel John Woelfel (left) and Captain Allen. Coop would go back in a minute to Johnston; one of the truly unique spots on this globe.

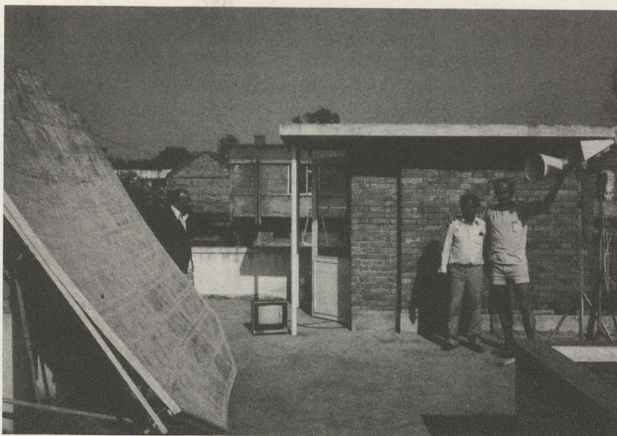
banded amplifier that was supposed to provide 10 watts per channel output. After some faults, that system is still operational today. For channels 7, 9, 11 and 13, Doug selected the ten watt units from **Browning Labs** (see their advertisement in CSD). Now he feeds a set of Scala cable TV receiving dipoles (used as transmitting antennas) stacked all over a new 96 foot transmission mast. This is not a difficult island to 'cover' with ten watts since the most distant point on-island is less than two miles from the antenna tower and the terrain is manmade, like an oversized aircraft carrier deck. A weather station on a small nearby island some four miles away now also gets the full seven channel service. Just keep in mind that these 3,000 or so Americans are 8 hours 'west' of New York or Atlanta so they are watching the 6 PM news at 10 in the morning at a location that is only 1 hour 'east of tomorrow'. The reach of our US 'domestic birds' never ceases to amaze me.

And then there is Canadian pioneer **Jan Spisar** of Ontario, Canada. Jan went with us to visit **Arthur C. Clarke** in Sri Lanka in the fall of 1983 and since then he has been globe trotting with great regularity.

Jan recently returned from climbing around the lower slopes of Mount Everest and he thinks he has worked out a system to bring TV to Nepal. Everyone should have a hobby.

Jan's hobby is finding people who suffer from poor communications or no communications at all. Jan 'hiked' (that's his word for the trip) for ten days from the town of Lukla to the base camp area of Mount Everest. He described life there as 'primitive'. There are no toilets at the 'hotels' and they cook on an open fire. Jan is in excellent physical condition and he would have to be to trek around at 20,000 feet for a week or more. He tried to carry a 5 kilogram backpack and found that was his endurance limit. Local Sherpa girls, not yet 20, easily transported **4 such packs** and showed no signs of exhaustion. Oh yes, Jan paid \$2 a day for this chore. If you think that was a bargain; the overnight lodging and food at the way stations cost him 25 cents a night.

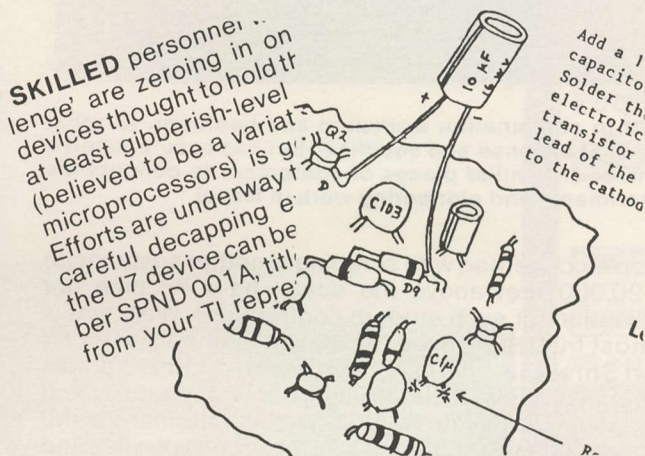
Believe it or not, all of this has something to do with satellite communications. As Jan notes, the whole value system is much different in such a primitive land. Television is a foreign instrument with no useful value.



JAN SPISAR (right) optimizes feed on 2.6 GHz Indian feed with Hari.

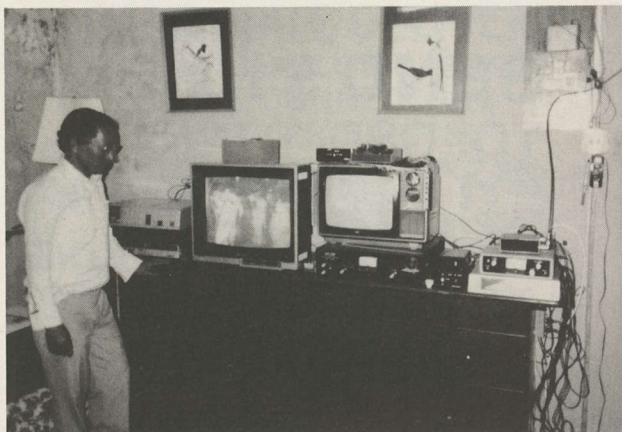
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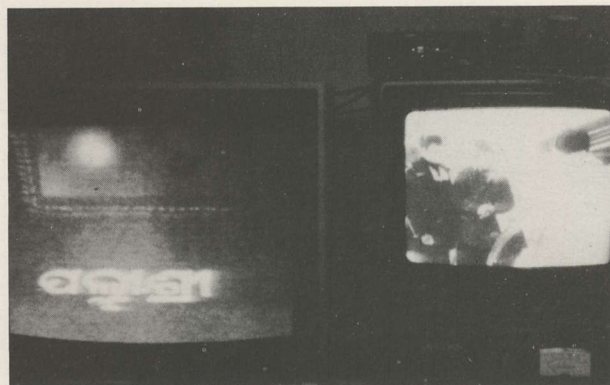


HARI in combination workshop and bedroom. At great personal expense and sacrifice Hari has accumulated a number of familiar pieces of equipment to conduct his experiments and pioneering work in Nepal.

People concerned with scraping together sustenance at 20,000 feet above the ocean have no time nor inclination for such modern contraptions. Well, that is **almost** true. High in the Himalayan foothills Jan found **Hari Shrestha**. This man has created a modern series of home dish installations using his own creativity and ingenuity. He has no Radio Shack in Kathmandu and the nearest TVRO enthusiast is thousands of miles and centuries in 'time' away. Yet Hari has fully operational home dish systems using the Russian 700 megahertz UHF EKTRAN satellite feeds, the 2.6 GHz Indian satellite 'DBS' services and the common to us 4 GHz Intelsat (and Russian) transmissions. Hari has built his own Spherical reflectors for antennas and once he had the satellite feeds operational he figured out (from CSD articles, of course!) how to transmit signals to others in his community. He began with a 1/2 watt transmitter pieced together from transistors he gleaned out of receiving equipment and today they have graduated to the staggering power of 100 watts. Bigger plans are in



HARI Shrestha with hand on UHF two element 'beam' he used to bring the first TV broadcasting to Nepal; 1/2 watt in the UHF band! Spherical dish behind Hari is used at 700 MHz, 2.6 GHz and 4.0 GHz.



TWO BIRDS/ two bands. Indian 2.6 GHz reception on left hand screen; Russian 700 MHz reception on right hand screen. Not an HBO logo in sight!

the offering; a 10,000 watt (UHF band) station is being planned. Hari also still pumps 1/10th of a watt across his neighborhood as well, sharing the Russian Ekran transmission fulltime with a few neighbors.

In the photos here you will recognize some familiar pieces of equipment; an **AVCOM** and an **Anderson** receiver, for example. That should make Andy Hatfield and Keith Anderson proud. Hari thinks there may be a small business in selling home dishes to those fortunate few in Nepal who earn more than \$2 a day or sell lodging for more than 25 cents a night. He has set his sites on providing the Indian 2.6 GHz transmission as a single home package. Hari selects this one over the many Russian services available or Intelsat because of the similarity in language between Nepal and India. Hari is building his own 2.6 GHz downconverter packages, by the way. Shades of Keith Anderson!

As Jan so aptly pens in his report to me... "**The fact is that with a per capita income of (US) \$150 per year, the country cannot support any rapid new changes in technologies or lifestyles. As a people, we in the west have long ago forgotten how to do things when we have no money to work with. I think we may have grown used to wasting our resources and tolerating no mistakes. One forgets the old adage that 'If first you fail, try-try again'. In Nepal and other such countries, this old saying is a way of life.**"

Jan wants to help out in Nepal by creating a communications system for the area that leads between the town of Lukla and the base camp area for the final climb to Mount Everest. This is located at the point called Khumbutse/Cho-Le. If you walked the 'path', as Jan did, it is only 30 miles. Anything approaching line of sight or high power VHF is out because the path dog legs all over the Himalayan slopes approaching Everest. **There is no money for this project**, but the need is great as evidenced by the letters of support Jan received from various medical and mountain trekking outposts along the way. Anyone with an interest in helping a country that still has not made the 'Third World List' can contact Jan (Spisar) at 14351 Airport Road, RR 5 Caledon East, Ontario, Canada L0N 1E0. **First** we get them **radio** communications; **then we'll worry about** how we get HBO into Kathmandu!

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